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THOMAS SCHIEB
Ambassador of Germany

The Course of the Energy (R)evolution in Germany

BILJANA FILIPOVIC DJUSIC
Assistant of the Minister of Environmental Protection

Afforestation as a Mission

Prof. Svetlana Stevovic, PhD And Prof. Ratko Ristic, PhD

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Dear readers,

When the second issue of the electronic bulletin dedicated to the COP 21 Conference on Climate Change was being prepared in November 2015, the aim of the Editorial board of Energy portal was to raise the awareness of the local public about the increasingly obvious consequences of climate change which include, among others, heat waves, extreme cold, droughts, heavy rainfalls and floods.

It has past almost four years since then – the bulletin has been enriched and took an outfit of a Magazine. We have published a total of 14 thematic issues since – even though the information in this area did not participate side by side with political and economic topics in our mainstream media, there's been noticeable progress in their representation. We want to think that we have contributed to a better understanding of the need to protect life on our planet through our work on Energy portal and in the Magazine.

Still, that was not enough. After organizing a prize competition for the best eco-photography on our portal, we have prepared an exhibition of selected works. The exhibition "Nature in its beauty and distress" made out of twenty-seven most striking and award-winning photographs travel as a little caravan through Serbia with an ecological mission. The journey of our little caravan embarked at the end of June from the "terminal" in Takovska 10, where the exhibition was previously opened, and awards given at RTS Gallery. At the next stop in the Archives of Vojvodina, the exhibition stayed for about 20 days in July, and on 24th September the caravan arrived at the "Olivera" Gallery, at the endowment of Svetislav Zilovic in Vracevsnica, near Gornji Milanovac. The hearts of all our inhabitants to whom nature is an inseparable part of their own being will be touched by the beauties of Serbia, and also by the scenes that show how nature itself struggles to survive. Soon, we will let you know about the next place where you will be able to see these photographs.

Until then, we have put at your disposal the latest environmental information and striking views on climate change that we have consolidated in the new issue of Magazine. Our interlocutors, including Thomas Schieb, the German Ambassador, Biljana Filipovic Djusic, Minister's Deputy, Sector for International Cooperation and European Integration at Ministry for Environmental Protection, Svetlana Stevovic, PhD and Ratko Ristic, PhD, professors, Milena Vukomirovic and Vladimir Djurdjevic, Assistant Professors, as well as many others, give us insight into how far we have come with the measures that should provide us with the future.

In the end, to quote PhD Vladimir Djurdjevic, PhD: "We have to be aware that there is no excuse for not taking action".

Nevena Djukic,
Editor in Chief

8 THOMAS SCHIEB

The Ambassador of Germany

By Adopting the Renewable Energy Sources Act (EEG) in 2000 the Foundations Were Laid for the German Energy Revolution

The Renewable Energy Sources Act introduced feed-in tariffs for electricity generated from sun, wind, water or biomass for 20 years. The costs of this were passed on to the electricity consumers via the "EEG surcharge". The Ambassador of Germany Thomas Schieb says that, thanks to the funding from the EEG surcharge, renewable energy was transformed from a niche product into an essential energy source in the power mix.

16 BILJANA FILIPOVIC DJUSIC

The Assistant of the Minister of Environmental Protection for International Cooperation and European Integration

We Lack Ecological Administration at All Levels for Implementation of Solutions from the Chapter 27

"Local employees cannot even do their job responsibly enough when they are engaged in all issues at the same time. The least time is left for investing in environmental issues", stresses our interviewee and adds that one of the crucial steps, according to the draft of Action Plan for the Administrative Capacities Development for the environment, is that 760 people are about to be recruited in the period prior to EU accession.

IN THIS ISSUE »»

Photographs: (Thomas Schieb) Milos Luzanin; (Biljana Filipovic Djusic) courtesy of Biljana Filipovic Djusic

Photographs: (Milena Vukmirovic) courtesy of Milena Vukmirovic; (Vladimir Djurdjevic) courtesy of Vladimir Djurdjevic; (bottom) Unsplash/Stephan Mahlke

CLIMATE CHANGES

"As an actor, I pretend for a living; I play fictional characters. I believe that mankind has looked at climate change in that same way as if it were fiction. None of this is rhetoric, and none of it is hysteria; it is a fact," once said Hollywood favourite Leonardo DiCaprio, who is the envoy of UN's Secretary-General on Climate Change.

This statement by the famous actor and environmental activist reflects the true state of affairs, not only in Serbia but across our planet as well. We all live burdened with personal problems, and we do not overthink about climate changes, except when a disaster happens. However, it would be wise, before climate changes reach a dramatic level, to know why they occur and how we can mitigate their effects.

Very often you can hear that climate changes are a natural process and that even our famous scientist Milutin Milankovic spoke about them, yet here we are not referring to the natural cycles of warming and cooling, but to climate changes that result from human activities. These climate changes were first mentioned in the late 19th century, and the person who first spoke about them was the Swedish scientist Svante Arrhenius. The climate has previously changed solely as a result of natural circumstances. Nevertheless, with the advent of industry and population growth, the human factor takes over the primacy. Forecast for the near future is not bright at all unless we do something urgently given the fact that the climate changes will grow and consequently the unfavourable living conditions on the plant will also grow.

Of course, there are always divergences, and climate changes are no exception. Scientists find arguments for and against climate changes, yet we can say with certainty that greenhouse gases resulting from human activities are on the rise and they have a significant effect on the enhanced warming of the atmosphere. The concentration of greenhouse gases before the Industrial Revolution was around 280 ppm (ppm – parts per million), reaching a record level of 405.5 ppm in 2017. It is well known that the increase in

Photograph: Sinisa Ljubisavljevic

the concentration of these gases occurs as a result of the burning of fossil fuels.

Of course, these are not the only consequences of the increased concentration of greenhouse gases. In addition to the frequent and intense droughts and floods in recent years, the fact is that glaciers and polar caps are constantly melting, sea levels are rising, and ocean acidity is increasing. All this has an impact on the safety of drinking water, food and indirectly on the health of the population.

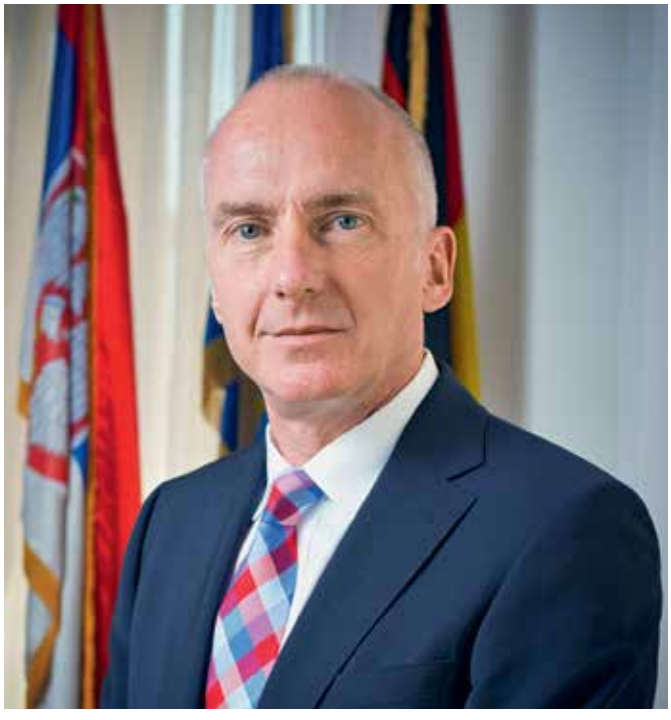
The extinction of wildlife is also linked to climate changes. Admittedly, climate changes are not solely responsible for the reduction of biodiversity. Human greediness plays a significant role in the diminishing diversity and abundance of once rich flora and fauna around the world. We ruthlessly kill certain animal species due to fashion, superstition or prestige.

We do not stop even there. It appeared in the media that the Amazon fire was set, which has not been confirmed yet. As if it is not enough that forest fires are catching up more extensive areas, due to high temperatures and heatwaves, even in the areas not prone to wildfires.

We can always choose the easier path and continue to deny that our planet and its ecosystem are in danger. As if a man belongs to another, reserve ecosystem. I am not sure how long life on the planet can survive. Even if one does not believe in climate changes and does not worry about their consequences, we should at least be slightly concerned about what kind of air we breathe, what kind of food we eat and what kind of water we drink. Our planet needs fighters who won't give up on it, especially young people and teenagers like Greta Thunberg.

It seems to me that I am not the only one who feels like we are all standing on the edge of an abyss with eyes closed. Still, if we would open our eyes, we might take a step backwards to save ourselves. Many people made this life-saving step before us. Thus, Leonardo, Greta invited us to the awakening, and Rambo Amadeus, Vojin Cetkovic and Vuk Kostic have done that from the pages of our Magazine. They all strive to leave a nicer and better planet to the future generations by using their popularity to influence all those who are ignoring the elephant in the room.

Nevena Djukic



Thomas Schieb, German Ambassador

Thomas Schieb has been German Ambassador to Serbia since August 2018. He is an economist by profession. Before taking up his current position, he spent four years in New York working as a political coordinator in the United Nations Permanent Mission.

His diplomatic career led him through different cities - from Berlin, through Brussels, to London.

In the past, he has already resided in the Balkans as a clerk in the Special Staff for Bosnia at the Ministry of Foreign Affairs in Sarajevo from 1994 to 1996.

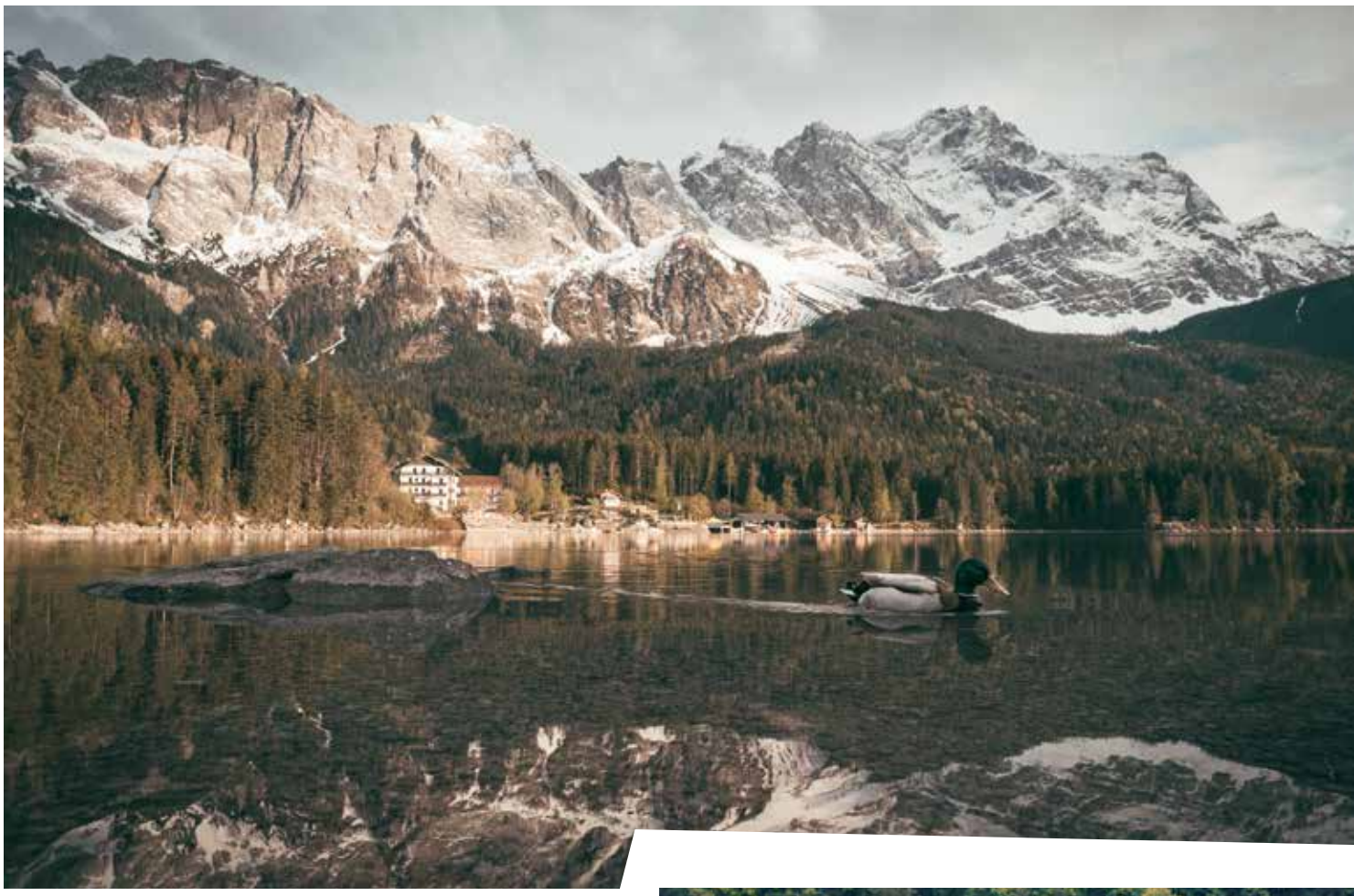
"The Renewable Energy Sources Act (EEG) has laid the foundations for the German 'Energiewende' and was initially adopted in 2000"

Photographs: (top) Unsplash/AC Almelor; (bottom left) Milos Luzanin; (on the next page at the bottom) Unsplash/Ansgar Scheffold

THE COURSE OF THE ENERGY (R)EVOLUTION IN GERMANY

The term evolution, referring to a gradual and continuous social development, is often used as a total opposite to the term revolution, which brings sudden and dramatic shifts of the existing system. However, their meanings could be united in the energy transition – a process of phasing out dirty energy in favour of the clean alternatives to which the sky is the limit – or, to be precise, the Sun is the limit. We had an opportunity to talk to the ambassador of Germany to Serbia Thomas Schieb on how the energy is unfolding on German soil.

EP ***March of 2019 was significant for the Energiewende. For the first time in history, Germany generated 54.5 per cent of electricity from renewables. How did your country get to this important milestone and what sources are contributing the most to its cleaner energy mix? What is the plan of Germany for renewables in the forthcoming years?***



Thomas Schieb Germany's electricity supply is becoming "greener" every year. The share of renewables in electricity consumption has steadily grown over the last few years – from about 6% in 2000 to around 40% in 2018. By 2030, 65% of electricity consumed in Germany is to derive from renewables. Wind and solar energy remain the most important forms of renewables in Germany while biomass and hydropower also constitute valuable building blocks in the energy system.

The Renewable Energy Sources Act (EEG) has laid the foundations for the German "Energiewende" and was initially adopted in 2000 introducing feed-in tariffs (FIT) for electricity generated from sun, wind, water or biomass for 20 years. The costs of this were passed on to the electricity consumers via the "EEG surcharge". The funding from the EEG surcharge transformed renewable energy from a niche product into an essential energy source in the power mix. Advances in technology have since significantly cut the costs of generating electricity from renewable sources. However, the rapid expansion of renewables also caused the EEG surcharge to rise considerably until 2014.

The Government reformed the EEG in 2014 and in 2016 to specify a gradual transition from FITs to an auction system.

As Germany is phasing out nuclear power by 2022 and coal-fired power by 2038, the use of renewable energy sources will be expanded. Currently, the main challenge

lies in the expansion and modernization of the power grid. An additional 5,800 km of high voltage transmission lines are required to transport power from abundant renewable sources in Northern Germany to the industrial centres in Western and Southern Germany. The German Federal Government has therefore made the German grid expansion a key priority.

EP ***What regulations and political actions are implemented in Germany to encourage citizens to invest in solar panels on their roofs and energy efficiency in their houses?***

Thomas Schieb In 2016, Germany adopted the National Action Plan on Energy Efficiency (NAPE) to reduce primary energy consumption by 20 per cent by 2020 compared with 2008, and by 50 per cent by 2050. NAPE defines three central aims: Firstly, to provide information and advice on energy efficiency to citizens, companies and municipalities. Secondly, to promote investments in energy efficiency in innovative ways. NAPE includes increased funding, e.g. for KfW Germany's "CO_2 Building Modernisation Programme" (for energy-efficient construction and retrofitting) or for various funding programmes for energy efficiency in companies. Thirdly, to introduce mandatory energy audits for large companies as well as new energy standards for new appliances and buildings.

Photographs: (on the previous page at the top) Unsplash/Stephan Mahlke; (bottom) Unsplash/Stanislav Korol

EP ***How will the miners and the workforce that is trained to work in the fossil fuels sector be transitioned to low carbon future when it comes to positioning them on the job market?***

Thomas Schieb In May 2019 the Government announced the allocation of up to EUR 40 billion by 2038 for the structural transition of Germany's coal-mining areas, which will include incentives for industries, investments in infrastructure as well as the establishment of new public research and administration institutions. Through a special program, a total of EUR 240 million have been allocated for immediate and short-term support to the regions. These measures will create future-oriented and well-paid jobs in the affected areas.

EP ***In a policy reversal following Japan's Fukushima Daiichi nuclear disaster, it was decided that Germany's 17 nuclear power stations will be shut down by 2022. How far have you gone with their closing?***

Thomas Schieb After the shut-down of two nuclear power plants in 2015 and 2017, seven nuclear power plants are currently in operation. Of these, one will be shut down in 2019, three more in 2021 and 2022 each.

EP ***What were Germany's greenhouse gas emissions, the share of renewable energy and energy efficiency targets under Europe 2020 and will all of them be achieved successfully?***

Thomas Schieb In 2018, Germany emitted 866 million tons of CO_2 equivalents (4.5% less than in 2017 and more than 30.5% less than 1990).

The share of renewable energy in the production of electricity was about 40%. In the entire energy mix, the share was about 17%.

When it comes to energy efficiency, Germany has reduced the consumption of primary energy by 10% compared to 2008.

While we are confident that the 2020 goals for the share of renewable energy will be reached, it is unlikely that despite all progress our national 2020 targets for the reduction of GHG emissions and energy efficiency can be achieved.

EP ***The automotive industry in Germany is one of the largest employers in the world and is considered the most competitive and innovative in the world. Are your domestic manufacturers keeping the pace with the trend of electromobility, which is the level of its development there, and how the authorities promote it?***

Thomas Schieb The Government supports e-mobility R&D Activities with ca. EUR 250 million annually and will further invest EUR 300 million into the expansion of the charging infrastructure by 2020. The Electric Mobility Act further grants privileges to electric vehicles, including exemptions and lowering of fees. Supported by the Governments e-mobility policies, the automotive sector has set itself the goal

of becoming a lead provider and market leader of e-mobility solutions already by 2020.

EP ***Climate protests are emerging all over the world. Will they be a wakeup call for the politicians to take climate action more seriously?***

Thomas Schieb The Fridays for Future movement is indeed a wakeup call for politicians. 24 out of 28 EU countries, including Germany, supported the transition towards carbon neutrality by 2050 at the last meeting of the European Council in June in Brussels. Climate change is high on the political agenda again. And this is also due to the pupils' protests.

Chancellor Merkel made it clear at the last Petersberg Climate Dialogue in Berlin in May this year that the question is not IF we can achieve climate neutrality by 2050, but HOW. In Germany, a new body was set up called "Climate Cabinet" chaired by Chancellor Angela Merkel which will discuss Germany's pathway towards climate neutrality by 2050. Furthermore, it will prepare a climate protection law with legally binding climate targets.

EP ***What do you see as Serbia's main setbacks in the domain of the environmental protection and what would you propose as their solutions? What campaigns have you run in Germany for the promotion of environmental protection, do you still have some of them that are active and is there any that could be useful to apply in Serbia?***

Thomas Schieb Strengthening and enforcing environmental protection is one of the biggest challenges for Serbia during the EU accession process. The last country report makes it very clear that on the one hand, new laws and by-laws have to be written, adopted and implemented – a

Photographs: (top) Unsplash/Alain Wong; (bottom left) Unsplash/Pavel Nekoranec

challenging task since the number of experts working on these issues is limited. On the other hand, massive investments are needed to improve the necessary infrastructure to protect the environment, including wastewater systems, waste treatment and civil protection measures.

In Germany, environmental campaigns are usually rooted in civil society. Good examples are the protection of forests under the threat of forest dieback in the 1980s, the promotion of local ecological agricultural production after the Chernobyl disaster in 1986 or the current discussion on climate change following the Fridays for Future movement.

Similar campaigns started to take place in Serbia. We are following the "Clean our lakes and rivers"- Campaign led by Blic newspapers. Every day their volunteers clean up waters of Serbia from polluting plastic, making Serbia's landscape beautiful again. The EU Delegation organized a comparable event in New Belgrade: Representatives of Serbia and EU embassies together took part in cleaning one part of the Sava bank. Citizens of Serbia consider waste management the most serious environmental problem in the country, followed by water and air pollution, as this spring's global IPSOS survey on ecological issues showed. At the same time, they are willing to change their habits. So, change has begun.

Serbia's European partners, Germany included, are happy to offer assistance – both financial and in the know-how – to Serbia in promoting this issue of critical importance – and Serbia is making good use of it.

EP ***Germany is one of the largest bilateral donors to Serbia. On behalf of the German government, GIZ and KfW support our country in moving towards integration into the EU and are engaged in the following priority areas - sustainable economic development, the rule of law, democracy, civil society and public administration and environment. Which of its projects would you underline as the most important?***

Thomas Schieb All our projects aim to improve the living conditions of people in Serbia during the process of EU accession. In total, the German government has committed more than 1.8 billion EUR to Serbia since the year 2000,

Citizens of Serbia consider **waste management the most serious environmental problem in the country**, followed by water and air pollution. At the same time, they are willing to change their habits – so, change has begun

Photograph: Unsplash/Johannes Krupinski

OUR COMMON PAST VS. OUR COMMON PRESENT

The forerunner of the European Union is the European Coal and Steel Community, established in the French capital Paris on 18 April 1951 by Belgium, France, the Netherlands, Italy, Luxembourg and West Germany. By joining, the countries have established a framework for coal and steel production and distribution agreements. From the 1950s until today, the situation on the international political scene has undergone radical changes, fueled by, among other things, scientific knowledge. We are now afraid of the climate crisis, which was utterly unknown to us at the time, and which we were, in fact, unconsciously "feeding" with our doings.

The organization whose occurrence was motivated by exploiting high carbon footprint materials is now implementing regulations in the field of environmental protection, renewable energy and energy efficiency to reduce its devastating impact on the planet. We asked the ambassador Schieb, which was, in his opinion, the watershed moment for making a shift from fossil fuels to their alternatives, and consequently improving the climate. "There were many decisive moments at the international level that advanced climate protection, starting with the Brundtland Report in 1987, followed by the Agenda 21 in 1992 and the Kyoto Protocol in 1997," he explained.

In 1983, the Brundtland Commission, also known as the World Commission on Environment and Development, was established. The outcome of its work was a comprehensive document entitled "Our Common Future" (1987). The importance of the Brundtland Report lies in the fact that it was the first time defining the coin "sustainable development" - "development that meets the needs of the present generation without compromising the ability of future generations to meet their needs". The concept received additional attention during 1992 at the United Nations Conference on Environment and Development in the Brazilian city of Rio de Janeiro. The result of the conference was the aforementioned Agenda 21, which includes an action plan for sustainable development in the social, economic and environmental spheres. A further "escalation" of climate action occurred in 1997 when the Kyoto Protocol was adopted to reduce the emission of six harmful gases.

"The EU took a decisive step in 1998 when it published 'Towards an EU Post-Kyoto Strategy', which – among other issues – called for an increase in energy efficiency to reduce greenhouse gas emissions and laid the foundation for the European Union Emissions Trading System", Schieb concluded.

An additional 5,800 km of high voltage transmission lines are required to transport power from abundant renewable sources in Northern Germany to the industrial centres in Western and Southern Germany

Photograph: Unsplash/Karsten Wurth

which makes us the most significant bilateral donor. In our cooperation we tackle very different problems and use a vast array of approaches: We collaborate on the installation of water treatment plants as well as the assessment of social services needed in municipalities or the welder training of people that have never before received professional training. All these approaches contribute to Serbia's future in their way.

Important to note is that we do not stop at national borders. When we cooperate with Serbia, we know that the country plays a vital role in the whole region – and the region influences Serbia. Therefore, we support regional cooperation projects, too, for example, on biodiversity or rural development.

EP ***Would you mention any other forms of cooperation between our countries?***

Thomas Schieb The ties between our countries are multiple, but let me add two more areas of cooperation which I deem important:

Firstly, there are the cultural and human dimensions: An estimated 400.000 Serbians live in Germany, the German minority in Serbia amounts to roughly 4000 members. German is – after English – the second most important foreign language in Serbia, with 2300 schools offering classes. The Goethe Institute – in Belgrade for almost 50 years – and an office of the German Academic Exchange Service DAAD are promoting a very intensive exchange in the areas of culture and science respectively. German artists regularly participate in BITEF as well as the Belgrade Jazz and the Belgrade Dance Festival, for example. Young Germans increasingly discover Belgrade as a vibrant party city, German tourists Serbia's beautiful nature.

Secondly, the economic ties between our countries are becoming closer continuously: Germany is Serbia's trading partner no. 1. 450 German businesses are active in the country, and more and more are coming to Serbia. Overall, they created more than 58.000 jobs so far, including in Research and Development, thus requiring ever-higher skills.

Interview by: Jelena Kozbasic

Photographs: (top) Unsplash/Mika Baumeister; (bottom right) Unsplash/Christie Kim

AFFORESTATION AS A MISSION

Chapter 27 in the EU accession process, which relates to the environment and climate change, is one of the most complex and costly ones when it comes to the administration. Biljana Filipovic Djusic, Assistant of the Minister of Environmental protection, Head of the Department for International Cooperation and European Integration and the Deputy of the Head of the Negotiating Group for Chapter 27, explains how far we have come with harmonizing regulations in this area and what are the obstacles along the way

Biljana Filipovic Djusic,
Landspace architect

Harmonization of environmental and climate change regulations is a long-term process. It is known that these regulations are continually changing and improving at EU level, as well as a lack of administrative capacity in this area. All this additionally complicates the process, and thus represents a great challenge for the Ministry of Environmental Protection to prepare and propose about 100 bylaws in order to complete the transposition of the acquis in this area, says Biljana Filipovic Djusic.

EP ***For Serbia to reach the EU standards in the field of environmental protection, about 15 billion euros is needed. What should be the first and foremost thing to invest money in and how to get the resources?***

Biljana Filipovic Djusic Many documents have been prepared within the draft Negotiating framework. In these documents are given a detailed plan of activities, necessary investments are also calculated and proposals which sources could be used for financing. According to the estimates of the Multi-annual Financial and Investment Plan, 64 per cent of the resources could be financed from the European funds, about 18 per cent from the national budget, 4 per cent form a local budget and the remaining 14 per cent from the loans. The areas that need most of the investment in the following period are wastewater, drinking water, waste management and sludge management. Of course, documents are being drafted, and the final solution will depend on the possibility of withdrawing money from the EU funds but also on the funds earmarked for the environment in the budget of the Republic of Serbia.

EP ***Local self-governments have an important role to play in implementing solutions from Chapter 27. Surveys, however, show that the two-thirds of local self-governments in Serbia have only one or none of the employees engaged in environmental protection. How can we raise environmental awareness at a local level?***

Biljana Filipovic Djusic In this case, environmental awareness is not the main problem. The problem is the lack of ecological administration at all three levels (republican, provincial and local). Local employees cannot even do their job responsibly enough when they are engaged in all issues at the same time. The least time is left for investing in environmental issues. As a part of the package of documents accompanying the Chapter 27 Negotiating Position, a draft of Action Plan for the Administrative Capacities Development for the environment has been developed. In this plan, a shortage of about 760 people that need to be recruited in the period prior to EU accession is recognized. It is one of the crucial steps so that an appropriate environmental apparatus in local self-governments would be established, thus enabling the proper implementation of regulations in this area.

EP ***Serbia is the largest recipient of EU pre-accession grants in the region of Western Balkans. Which environmental projects have been implemented so far thanks to the donations?***

Biljana Filipovic Djusic Sector for Strategic Planning and Projects at the Ministry carries out the activities for implementation of projects financed from pre-accession funds worth about 40.5 million euros, which are of great importance for the field of environmental protection in Serbia. In accordance with the plan and programme, the ongoing projects from IPA funds are being implemented, such as, among others: construction of Regional Waste management centre in Subotica, construction of wastewater treatment plant in Raska, strategic mapping of noise in Nis, the system for the collection and treatment of wastewater in Kraljevo, the creation of the wastewater treatment plant and the development and rehabilitation of wastewater collection system in Nis and many others.

The program IPAs for 2019/2020 are in progress. Based on the comments made by the European Commission, the Environment and Climate Change Action Plan have been finalized and re-sent to Brussels for revision.

EP ***Compared to the developed countries, Serbia has a minimal share in terms of greenhouse gas emissions. What***

BILJANA FILIPOVIC DJUSIC is a landscape engineer with the extensive experience at the Ministry of Environmental Protection, where she has been working since 1992. Since 2004 she has been managing the Department for European Integration and International Cooperation, and she is an active representative of the Ministry in numerous international institutions. Last year she became a member of the European Bureau of the Environment and Health and was elected co-chair, which she sees not only as a personal success but also as recognition to Serbia for its activities in this field.

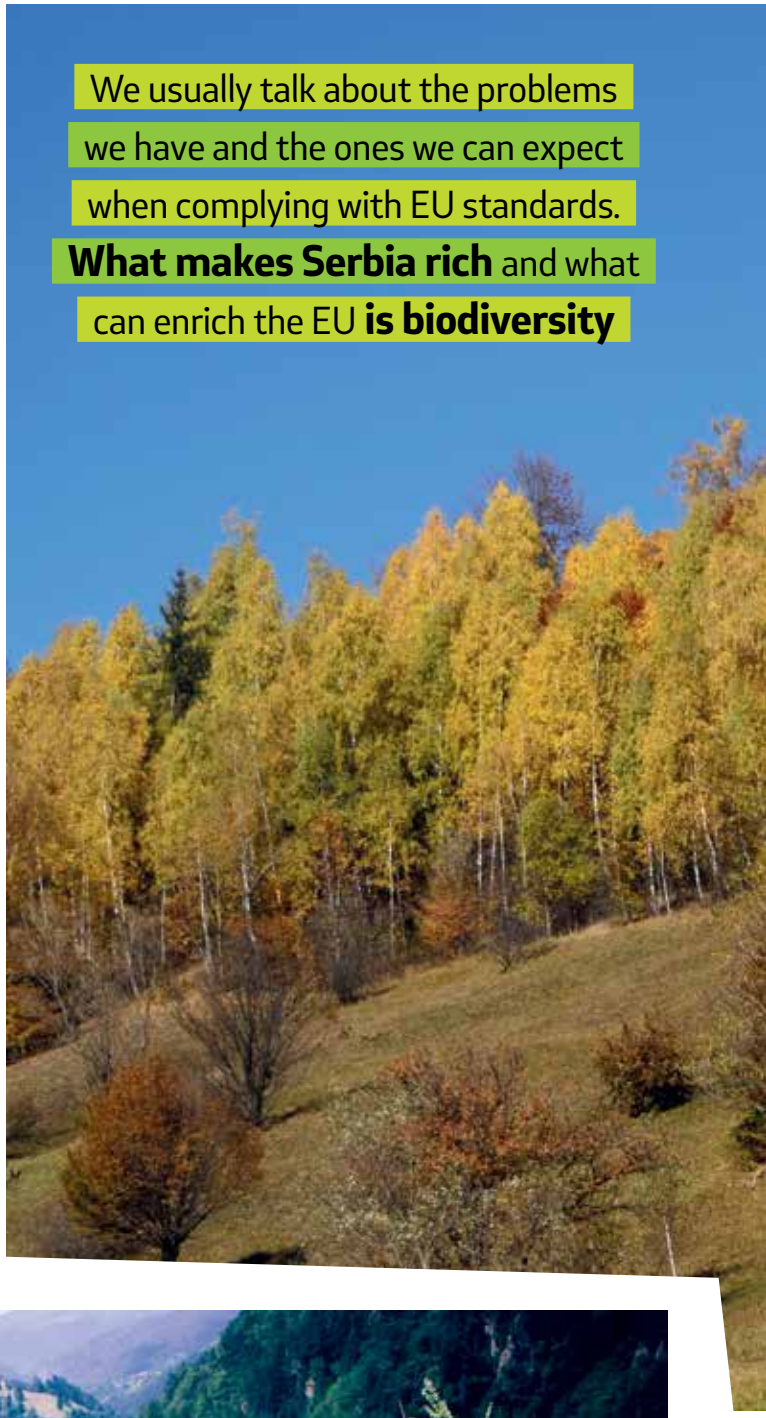
Photographs: (on the previous page) Unsplash/Dejan Zakić; (top) courtesy of B. Filipović

additional benefits Serbia has and how much that can help us with harmonization with EU standards?

Biljana Filipovic Djusic I am glad that you have asked that question since we usually talk about the problems we have and the ones we can expect when complying with EU standards. What makes Serbia rich and what can enrich the EU is biodiversity. In this regard, Serbia will propose three additional habitat types to the EU during the negotiation process. These habitats require the establishment of new categories of protected areas and a dozen of species that need to be protected throughout the territory of EU Member States.

EP ***At the Innovative Solution Forum last year, you selected 12 projects for the reduction of greenhouse gas emissions. Are any of these projects underway and which ones?***

Biljana Filipovic Djusic The projects presented at the Innovative Solutions Forum were of most interest to investors and based on predefined criteria and technical evaluation, five projects were selected to receive funding for implementation co-financing in April 2019. These are the following innovative projects: the company "Jugo-Impex" from Nis with the project "End of Polyurethane Foam Waste"; the company "Eso Tron" from Rumenka with the project "Reduce Garbage for Collective Health and Happiness"; the company "Sanicula Co" from Gornja Mutnica near Paracin with the project "Innovative Approach in the Production of Biomass Pellet Made from the Processing of Medicinal Plants"; the company "GreenEnergy Point" form Belgrade with the project "New Approach to the Production of Electricity and Heat from Wood Biomass"; the public utility company "Toplana Sabac" from Sabac with the project "Establishment of SCADA System for Monitoring and the Control of Operation of Thermal Substations on the District Heating System of Sabac". The implementation of these projects started in May 2019 and should be completed by the end of 2020.



Photographs: (bottom) Unsplash/Marijana Petrović; (top) Unsplash/Felicia Birloi

EP ***You have been working at the Ministry of Environmental Protection for 27 years. It is obvious that nature and ecology are your lifelong commitment. What is ecologically unacceptable to you as a citizen?***

Biljana Filipovic Djusic The greatest environmental crime is reflected in the aggressive behaviour of individuals or legal entities, the destruction of plant and animal species and throwing waste into the rivers. Unfortunately, we still face that on a daily basis and fight against it by any means. A case that recently occurred in the village of Donje Medjurovo near Nis, when an unknown person fired from an air rifle on a white stork, a strictly protected animal species throughout Serbia, has brought the arrogance of individuals into the focus. Cutting a tree is a crime for me. Forests are the lungs of our planet; they give us oxygen and provide so many benefits. The world would be a better place if each of us planted a tree at least once a year. We are not even aware of the fact that afforestation is the cheapest and at the same time, the most effective way of fighting climate change. Our minister has been committed to afforestation since the beginning of his mandate, and at the same time that is also a great mission of all of us who, not only professionally, but also out of love, deal with the environment.

The world would be a better place if each of us **planted a tree at least once a year**

Interview by: Gordana Knezevic

HOW ABOUT BEING A TOURIST IN BELGRADE?

Photograph: Unsplash/Bence Boros

September brought the first cold days and some citizens already brought out sweaters and jackets in the light. But, if we can trust meteorologists, October may bring us pleasant Indian summer so that we can put back those warm clothes in the darkness of our wardrobe for a while. We should thank Ada Ciganlija, our salvation from the city crowd, once again by absorbing vitamin D at the beach and wearing out shoe soles in the forest path or wheels of our bicycles, roller-skates and electric scooters on the roads. For everyone who doesn't own a vehicle that suits him, at Belgrade seaside, it has been available for years to rent roller-skates and bicycles, but the electric scooters are new – they are here less than two months.

A new post was opened in July for rental of electric scooters at the beginning of the path on the Sava side. During the last year, electric scooters timidly started conquering streets all around the world. This year the breakthrough was even more aggressive. The number of people riding them multiplied in the capital of Serbia, successfully avoiding traffic jams and construction sites barricades. Due to its affordability, it is estimated that interest in alternative, ecological, fast and comfortable ride to the desired destination will increase. Until you are bold enough to buy an e-scooter for yourself, you have an excellent opportunity to put them on trial at Ada Ciganlija, where you can rent one for an hour or the whole day ride.

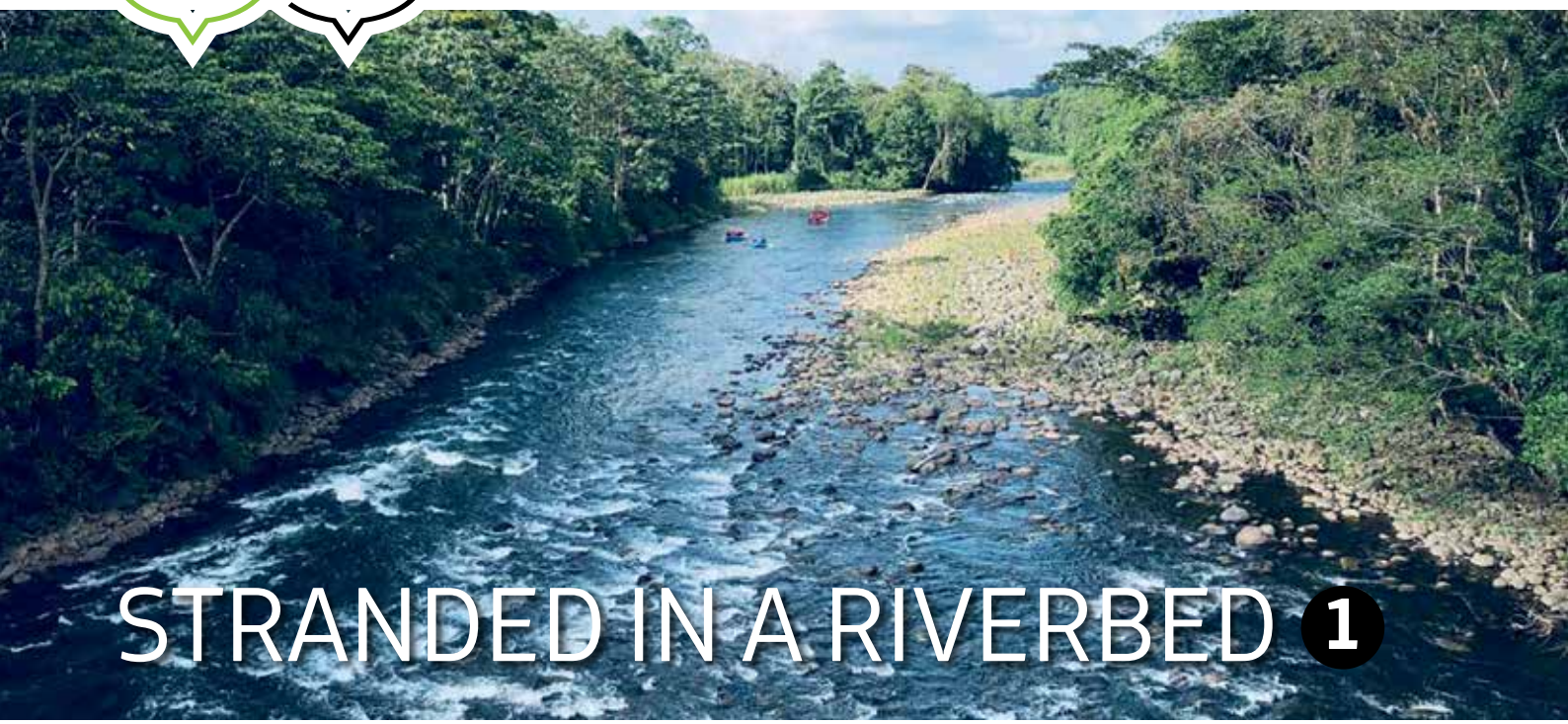
Until you are bold enough to buy an e-scooter for yourself, you have an excellent opportunity to put them on trial **at Ada Ciganlija**, where **you can rent one for an hour or the whole day ride**

Electric scooters can develop speed up to 35 km/h and the battery can take you about 40 km from the start point without a problem. Maximum payload is 110 kg – which is, you have to admit, impressive for a two-wheeler of ten kilograms.

According to the research results, one-third of the drivers of electrically powered scooters are tourists. When was the last time you enjoyed the beauty of the city you live in from that perspective? Have you ever tried to look through their eyes the plates with the names of crucial politicians in Yugoslavia posted in front of trees in the Park of Friendship or beautiful building of The National Theatre? In what way does a person perceive our city, his simultaneous slowness and rush and taking it in a relaxed manner as an integral piece of city charm and not as an obstacle on the way home after a stressful day at work.

For the next weekend, we suggest you take the role of a curious man living far from Belgrade. Ada Ciganlija could be your starting point. With an electric scooter, the tourist perspective in your city has never been closer, and with the battery reach of 40 kilometers, even Zemun isn't far away. Nacional star company enabled electric scooter rental at this artificial island. You can find them in Novi Beograd, address 12, Urosa Martinovića St (shop number 6) – for rental or purchase.

Photographs: Energetski portal



STRANDED IN A RIVERBED 1

When the first hydropower plants were being built in our country more than a hundred years ago, people assisted in their construction, clearly recognizing the direct benefits of such facilities. Today, the local community often cannot find the interest to support such projects. Moreover, citizens are increasingly joining together and organizing protests to get in the way of the construction of small hydropower plants (SHPPs).

The situation is complex, without any doubt. In the field, tension is increasing day by day. Residents of the area, who are most affected by the construction of the SHPPs, fear that soon, there will be neither wildlife nor water left in their streams and rivers.

We asked two experts if the construction of small hydropower plants is a national interest, or a public interest is to stop the process of further construction of these power plants, and how to find the right balance between the need for clean energy on the one hand and the conservation of water resources, biodiversity, and the environment on the other.

On the pages that follow, these questions were answered by Prof. Svetlana Stevovic , PhD, scientific advisor at the Innovation Centre of the Faculty of Mechanical Engineering, University of Belgrade, and Prof. Ratko Ristic, Dean of the Faculty of Forestry, University of Belgrade. You will notice that their points of view are sometimes contradictory. Nevertheless, they should help us understand the causes and consequences arising from this burning issue.

EP ***Can you draw a parallel between the construction of the first power plant in this region and today's construction expansion when it comes to small hydropower plants?***

Svetlana Stevovic The first SHPP in Serbia ("Sveta Petka") was built over 100 years ago on the Nisava river. It is still in operation. Similar facilities exist in about 60 more locations. According to the records of the Serbian Energy Efficiency Agency, today there are only about a dozen included in the state's electricity system. A century ago, SHPPs were a huge novelty. They supplied the locals with electricity they did not have until then, and consequently saw their interest in building and/or supporting them. Today, the situation is much more complicated. Residents of a local community in the area where the SHPPs are built, generally have electricity, and therefore do not have the impression that they need SHPPs in their area. Although the electricity they use comes predominantly from thermal power plants, residents are often unaware of the quality of life led by their fellow citizens living in the vicinity of thermal power plants and exactly they are the ones who should contribute to reducing global warming by accepting the construction of SHPPs on their stream. Hypothetically, if the state resolves its obligations to reduce CO_2, by instantly reducing the capacity from thermal power plants and then leaving the households without electricity, residents would again assist in building SHPPs in their communities. Given the current tensions regarding SHPPs, it is necessary to find the right measure between the environmental impact and the need for clean energy. Energy is an essential basic requirement for maintaining a modern civilized life. At the same time, care for the environment is also an element of modern civilization. Science offers a solution in this goal conflict. Each case needs to be analyzed in detail, holistically and to determine the level of accep-

Photographs: (top) Zorica Obradovic; (middle left) courtesy of Svetlane Stevovic

table environmental impacts to meet the needs for clean and renewable energy.

EP ***Could we expect the effects of the rebellion against small hydropower plants to be transferred on to other renewable sources since there is always some environmental impact and the electricity bill includes – which is currently very negatively perceived – a compensation for privileged producers for all renewable energy sources and not just hydropower?***

Svetlana Stevovic Rebellion is always possible if the public is not well informed. The technological process of getting electricity is not cheap at all. Citizens are paying the highest price for the consequences of producing electricity from fossil fuels, primarily coal, among other things by their poor health. Similarly, subsidies in renewable energy (RES) are known to be one-off. They last for 12 years, after which RES is in the free market. As it turned out so far in Europe, these RES influenced the reduction of the total electricity price in the market. It is because RES projects, relieved of financial obligations after exiting the subsidy period, can drive down the cost. If you were to campaign against other RES sources, you could always find arguments against construction, as each construction causes some environmental disturbances, and through ecology, you can easily provoke rebellion and overturn any solution. One thing is for sure: the rebellion caused by the environmental impact of electricity generation, if this continues with protests against the use of RES, as well as the overthrowing large and necessary multi-purpose hydropower facilities, could easily be transformed into a revolt caused by a lack of electricity.

EP ***When it comes to the degree of utilization of water flows, the example of Norway is often cited, since 99 per cent of this country's electricity is generated from hydro flows, with a large share of derivative hydropower. The construction of even larger and especially small plants in this country was accompanied by protests by environmental activists and other associations. Still, debates also took place between experts and investors, with the participation of citizens from local communities. Why don't we have public debates on this topic?***

Svetlana Stevovic It is a good question. The state should certainly take the initiative in this regard. But, here, public debates have begun to take place. SASA (Serbian Academy of Sciences and Arts) organized a Symposium on "Environmental Impact of SHPP", at which I gave a lecture on "The Concept of SHPP Construction in the Light of Conflicting Interests and Synergy Solutions". A serious debate was opened at the symposium. Contradictory opinions of exhibitors and discussants were heard. The problem arises when, due to some examples of misuse of water as a common good, the general conclusion is drawn that all SHPPs are harmful to the environment.

In practice, the problems occurred because the local population did not participate in public debates or get involved until the beginning of construction. Then there were situations where it was impossible to change anything because the building permits were issued. In my paper, I propose a new holistic, methodological approach to the concept of SHPP construction, in which at the very beginning of the decision-making process, all relevant criteria would be considered and engaged, given appropriate weight and importance to each, and an expert system would be formed to make timely decisions about the optimal concept construction as a synergic solution of technical and environmental systems. Of course, this includes the decision not

Prof. Svetlana Stevovic,
PhD, Scientific Advisor for renewable energy sources at Innovation Centre, Faculty of Mechanical Engineering in Belgrade

In her 35 years of experience, prof. Svetlana Stevovic, PhD, has done more than 55 multi-purpose projects for hydropower and hydro technical facilities in Serbia, Europe, Asia, Africa, North and South America. She has published 39 chapters in international scientific monographs, 22 papers on SCI list, has 2 editorial boards of journals from SCI list, 24 invited lectures at international scientific conferences, 88 papers published in international scientific meetings, 2 scientific monographs, etc. She made a special scientific contribution by laying the foundations for the methodology of choosing the optimal hydropower solutions, applying modern mathematical methods of artificial intelligence, phase logic and expert systems, with equal and simultaneous inclusion of techno-economic, ecological and other, so far unquantified values.

Photograph: National association of small hydropower plants

to build. Another problem that happened in practice was that the protesters were exclusive, so it caused that the project, which was granted a building permit, was implemented with police supervision. The negative consequence was reflected in the fact that the local villagers did not receive the compensation they could get if they engaged in a joint search for a compromise. In practice, there have also been cases where the protesters against the construction of SHPP, who obstruct the functioning of a legally formed construction site, are also exposed to criminal and misdemeanour proceedings, exiting the whole situation as the biggest losers. A national strategy has long been adopted to build all RES, including SHPPs. In order to change anything, it is necessary to start discussions on a professional basis, without emotions, passion and politics. The energy issue is a national security issue and cannot be conducted on the street and in villages.

If someone put the **entire flow of a mountain stream in a pipeline** (derivation), he or she **should be punished**, and such SHPP **should be banned from operating**

EP ***There are generally two mutually exclusive claims in public. The first one is that derivative SHPPs dry up rivers because the biological minimum is not respected, especially in the dry months (the biological minimum is determined by "Srbijavode", and it generally amounts to 15-25 per cent of the average annual flow). The other is that SHPPs only use surplus water and that during the year without precipitation all the water is released into the river. Is there an instrument for verifying compliance with the biological minimum and is there information on how many SHPPs did not comply with it?***

Svetlana Stevovic This problem is easily solved, since the biological minimum, i.e. guaranteed ecological flow is released through fish paths. There is a direct relationship between the depth of water in the fish path and the prescribed flow. This is defined in each hydraulic project. It is up to the inspector to measure the water depth in an adequate location and to determine if the required amount of water is released. I do not have information on how many small SHPPs have not complied with the obligation to release a guaranteed ecological flow. Still, I know that the law defines very rigorous penalties for this offence. Also, I know that there are derivative SHPPs, where a smaller part of the flow diverts to the hydropower plant, and the larger one goes to the main river flow. It is not clear to me why, due to some failures in the field, where the offender did not comply with the statutory guaranteed ecological flow and was not punished, one wrongly concludes that derivative SHPP are harmful to the environment and even worse generally concludes that SHPPs are environmentally harmful?! It is an attack on the entire small hydropower industry, which could be significant industry in Serbia. The law stipulates a fine of 500,000 to 3,000,000 dinars for the economic offence of violation of the guaranteed ecological flow which has not been handed down to anyone so far. If this happened, unwitting investors would certainly calculate that it is more worthwhile to comply with the law.

EP ***It seems that the impact of the pipeline, which directs water from the riverbed to the powerhouse to produce electricity, to the living world in the river cannot be denied. How do we even know the intensity of this impact of any of the SHPPs?***

Svetlana Stevovic This impact is reflected in the temporary devastation of the riverbed. The problem arose because in the early years of the construction of SHPPs in Serbia, the conditions that the authorities prescribed allowed the design of pipelines through the riverbed. The mistake was corrected, and a ban on installing pipelines in the riverbed is now being prescribed. Considering that the impact is temporary as well as the tremendous regenerative power of nature because the pipeline is set up and after that, there is no reason to dig again in the area for the next 50 years, nature is revitalizing itself, and after a few years, we have returned to zero state of the environment. If someone put the entire flow of a mountain stream in a pipeline (derivation), he or she should be punished, and such SHPP should be banned from operating. These are individual negative examples. Derivation can be separated by e.g. only 5 per cent of the flow of the mainstream, then it can be only twenty meters long and should not exert special influence on the living world in the river.

EP ***Is the preparation of an Environmental Impact Assessment study mandatory for all SHPP facilities? What exactly is determined by the study, what are the parameters being checked and is it true that, for example, the design of fish paths is not defined by law, which leaves the potential for adverse effects on biodiversity?***

Svetlana Stevovic An Environmental Impact Assessment Study is mandatory for all power plants with a capacity of over 2 MW. The designers of all other smaller power plants must ask the competent authority whether they need to draft the Study. The authority decides if it is necessary to do

Photograph: National association of small hydropower plants

an Environmental Impact Assessment Study. In protected areas, this body is the Ministry of Environmental Protection, while in other areas the responsible body is the one of local self-government that is in charge of the environment. The scope and content of the Study are defined by the competent authority, and it may require that the study examines a number of different parameters. The design of fish paths is defined through the flow and characteristic speed. Form and type have not been prescribed by public authorities so far, so in practice, we detect cases of poorly designed fish paths.

EP ***How many SHPPs were built in protected areas? What additional permits are required for the construction in areas like this?***

Svetlana Stevovic To my knowledge, about 10 SHPPs are built in protected zones, which accounts for about 10 per cent of all constructed SHPPs. It is less than the European average. In EU countries, about 30 per cent of SHPPs are built in Natura 2000 sites. In Serbia, the Nature Protection Act defines the possibility of constructing SHPPs in the second and third-degree of protection, while in the first, construction is prohibited. The process of obtaining a building permit for these zones is much more demanding than the procedure for SHPPs in areas outside protection. The differences are reflected in the following: location conditions and building permit for the construction of SHPP in protected areas are issued by the Ministry of Construction, Transport and Infrastructure, and the decision of the Ministry of Environmental Protection is obligatory regarding the necessity for drafting an Environmental Impact Assessment Study. An additional means of verification of the project design was also introduced through the institution of the Republic Audit Committee, in which eminent professors of relevant faculties participate. The construction of SHPPs in protected zones has been raised to the highest possible professional level that this country possesses.

EP ***What has changed in our country and the world since the Cadastre of SHPP (which defined 856 potential sites for the construction of SHPP with a total capacity of 450 MW) in 1987? Do today's SHPPs problems arise partly from the implementation of this outdated document?***

Svetlana Stevovic Before I got my PhD and went to faculty, while working in Energoprojekt – Hydro engineering, at the Hydropower Systems Bureau, as a young engineering designer I was a participant in the development of the Serbian Cadastre of SHPPs. One of the key purposes of that document at the time was for the military. The Cadastre was made with the basis of technological development from that period, with different hydrological inputs and property relations. Due to climate change, hydrological regimes have changed in the world and in Serbia, the extremes have become more intense and more frequent, and each project done decades ago would have to be updated. Otherwise, in Serbia, the Cadastre of SHPPs was repealed under the Law on spatial planning. For the purpose of the construction of a small hydropower plant, it can only be used today as an information base. Each SHPP investor is obliged to create entirely new substrates with current data in the field of geology, geodesy and hydrology. In addition, public authorities thoroughly review the social, energy and other aspects of the current state of the site and issue conditions in accordance with all restrictions, and the answer may be negative. To conclude, referring to the 1987 Cadastre as a problem is merely a fiction of the opponents of the construction of SHPPs.

EP ***At what point is the impact on the natural environment considered during the construction of the SHPP?***

Svetlana Stevovic Analysis is made at an early stage of the project documentation development. When the investor is in the phase of developing a conceptual design for SHPP, a request is submitted to the Institute for nature conservation of Serbia, whose expert services decide whether or not a site can be built and, if so, under what conditions. Also, if the response from the Institute for nature conservation of Serbia for a site is positive, it is further evaluated through the Environmental Impact Assessment Study. During the construction, construction, water and environmental inspectors check whether the works are performed according to the issued acts or not.

EP ***Is it sufficiently heard in public that out of 120 SHPPs, in only a small number of cases environmental consequences were noted?***

Svetlana Stevovic Most SHPPs work harmoniously integrated into the environment. Most investors are conscientious and in the process of electricity production respect all the conditions defined by law. Still, the media has been flooded with photographs of several facilities, where smallholder interests are put in the foreground and where guaranteed ecological flow is not released. The images of construction sites are also often emphasized as images that should condemn the construction of SHPP, and these are impacts only during the construction. No construction site is pretty. This impact is temporary and smaller than the environmental disturbance caused by a single flood, and small dams built for SHPPs can help to receive part of the flood wave. The investor is legally obliged to do the recultivation upon the completion of construction. After the first vegetation, with the regenerative power of Mother Nature and the results of recultivation, everything looks like as if there were no works. There is no possibility of a more significant, irreversible, lasting impact on the environment. Inspection, of course, needs to be present and do its part of the job.

EP ***The Ministry of Environmental Protection of Serbia recognized the problem while pointing out that the way individual SHPPs were built had extremely damaging effects on the***

ecosystem. However, the construction of SHPPs is not within the competence of this Ministry. What should be done with built and partially built plants, and what about those that have all the permits and have not yet begun with the construction?

Svetlana Stevovic The Serbian Ministry of Environmental Protection could and should help more to calm the situation down in this area. If there is evidence that some sites have adverse effects on the ecosystem, the Ministry should designate them and take appropriate action. It is not true that the Ministry has no competence, as environmental inspectors are directly under the responsibility of the Ministry of Environment. The question may be raised as to why and how building permits have been issued in locations where there will be adverse effects on the ecosystem. A step forward should be prescribing conditions that are examples of best practices from leading countries in this field, as well as in the field of ecology. Inspection services should regularly check the built SHPPs and those under construction to comply with the guaranteed biological flow as well as all environmental impact standards. These standards should be updated, and new ones established if any environmental impact of SHPP is found to be worsening. It would also force negligent investors to exploit SHPPs following the permits issued and to continually update and work to modernize SHPPs in accordance with environmental principles. Regarding the SHPPs that have a permit and the construction has not yet begun, there are two options: either to allow construction or with the agreement of investors, to remunerate them.

EP ***Everyone agrees that we need energy from renewable sources. However, while proponents of SHPPs, primarily gathered in the National Association of Small Hydropower Plants, who consider hydropower plants the ideal solution for stable production, the least CO_2 production of all RES and the longest lifetime, point out that no inspections have recorded any irregularities in the work of SHPPs in their association, the opponents cite the extremely small share that SHPPs have and that all 856 planned SHPPs can have in the energy mix with a negative impact on the environment, as documented by striking images from Rakita. Why are their attitudes so different? What did we miss hearing about the expansion of SHPP construction?***

Svetlana Stevovic There are data presented in the National Renewable Energy Action Plan, which is that according to the plan, by 2020, SHPPs are predicted to have a 16.2 per cent share in RES. The total hydropower potential of the Republic of Serbia is estimated at 30 per cent of all RES, which makes it the most significant potential after biomass, whose share is estimated at 60 per cent of all RES. Striking images of the Rakita construction site emerged in public, and now the pictures of the excavation with rusty fittings have been replaced by pictures of landscaped shores and a nearly finished water intake facility. When completed, the grassy levees and a pond will make this part more beautiful and attractive than it was at the beginning of the construction. The story of the expansion of SHPP construction does not prevail, considering that fewer and fewer SHPPs are built each year, so the Republic of Serbia unfairly neglects this potential and the question is how it will meet its strategic and binding goals. The need for electricity is on the rise. In Serbia, whose electricity system (EES) relies mostly on the production of electricity from thermal power plants, there is coal for only fifty more years. Serbia lacks serious scientific research and works in the field of small hydropower. In the world, this issue is approached in a multidisciplinary way, so knowledge is broader, and arguments are more objective. In case when there are more information and proven expertise, the decisions are better, which is unfortunately not the case here.

Interview by: Tamara Zjacic

Photographs: National association of small hydropower plants

STRANDED IN A RIVERBED 2

Prof. Ratko Ristic, PhD, Dean of the Faculty of Forestry, the University of Belgrade

Professor Ristic teaches at the Department of erosion and torrent control at the Faculty of Forestry. He has published 100 scientific papers: 32 in scientific journals, 20 of which have been published in international journals, while 68 have been presented at national and international scientific conferences. As an author or co-author, he has published ten articles in monographs of international and domestic importance. He wrote a university textbook entitled: "Hydrology of torrential flows". He participated in the development of 115 projects and studies as a responsible designer or associate designer.

Photographs: (top) Goran Jordanski; (middle left) courtesy of Ratko Ristic

According to Professor Ratko Ristic, the large-scale construction of small hydropower plants is not a national interest. It is not the activity in accordance with the articulated needs of the majority of citizens because it has low energy effects for the wider community, disproportionately massive environmental damage, and brings only material benefits to investors and the users of SHPP, producers and equipment suppliers.

EP ***Can you draw a parallel between the construction of the first power plant in this region and today's construction expansion when it comes to small hydropower plants?***

Ratko Ristic The economic, energy, social and cultural contexts in which the first hydropower plants (HPPs) in Serbia were built, mainly small hydropower plants (SHPPs), more than 100 years ago, are incomparable with the present when the massive construction of SHPPs is imposed. After 100 years, SHPPs are certainly no longer a technological innovation, nor do they have the energy potential for Serbia's current needs. At the same time, their construction in mountainous areas, with very fragile aquatic ecosystems, brings different negative effects: intersecting access roads and removing forest areas, after which erosion processes progress rapidly; destruction of streams in sections of several kilometers

each, during the process of laying down pipelines; destruction of vegetation in the coastal area; disruption of groundwater regime due to reduced feedstocks issued on sections where water was moved to the pipelines; destruction or degradation of ichthyofauna as a result of habitat destruction or water derivation. In such circumstances, which do not represent the interest of the local community, it is only natural for the mass dissatisfaction of citizens to occur, especially if facilities are being built in populated areas such as Rakita village. After all, similar phenomena have been observed around the world, dealing with communities of university researchers, large and significant non-governmental organizations (American Rivers, River Watch, etc.), the World Bank, and reputable journals (Forbes, Guardian, etc.). Besides, numerous procedures have revealed violations of legal norms, conditions and opinions of competent state institutions, failure to respect the hierarchy of spatial planning documents, and the lack of efficient work of relevant inspection services. Particularly illustrative is the case of SHPP "Zvonce" (Rakita village, the municipality of Babusnica) where Water Conditions (No. 8422/1, dated September 24, 2018, PE "Srbijavode", VC "Morava" Nis) and the Decision of the Institute for nature conservation of Serbia (Nis Office, No. 020-1709, 2018) states: "... the pipeline route cannot be designed and constructed along the river stream in a riverbed for large water, and the vegetation within a natural riverbed for large waters of the Rakita River cannot be removed... ", while the situation on the ground shows just the opposite. Further, during the installation of the pipeline, a torrential landfill-consolidation barrier was perforated, the top of the stilling basin was destroyed, and high and small water levels were threatened, which could lead to intense regressive erosion, undermining the foundation, destroying the facility and endangering the safety of the downstream population in the village Zvonce.

EP ***Could we expect the effects of the rebellion against small hydropower plants to be transferred on to other renewable sources since there is always some environmental impact and the electricity bill includes – which is currently very negatively perceived – a compensation for privileged producers for all renewable energy sources and not just hydropower?***

Ratko Ristic I do not believe that the rebellion against SHPPs will affect resistance to other forms of RES, as they do not have such negative environmental consequences. Every human activity has some negative consequences for the natural environment. Still, if there is a clear consensus on the public interest, that is, the interest of the majority of citizens in an area, then the project is ethically acceptable. In the case of SHPPs, only individuals and interest groups benefit, with significant adverse environmental consequences, which is not acceptable to most citizens in our country.

EP ***When it comes to the degree of utilization of water flows, the example of Norway is often cited, since 99 per cent of this country's electricity is generated from hydro flows, with a large share of derivative hydropower. The construction of even larger and especially small plants in this country was accompanied by protests by environmental activists and other associations. Still, debates also took place between experts and investors, with the participation of citizens from local communities. Why don't we have public debates on this topic?***

Although we do not have any solar parks, there is no initiative to implement a project to install 50,000 solar panels on the roofs of individual residential buildings, which would serve to heat water for household purposes. How much electricity consumption would be reduced in this way?

Ratko Ristic First, when you mention Norway, it should be borne in mind that this country has an extremely rich water potential, and that Serbia is the poorest Balkan country when it comes to indigenous surface waters (runoff modulus q = 5.7 ls-1.km-2) and that it belongs to the poorer regions of Europe. Also, the issue of induced effects is raised, in light of the fact that Serbia is located in a part of Southeastern Europe that is hugely threatened by current and forecasted climate change, and as such it is identified globally. As far as the public debates regarding SHPPs are concerned, there were a lot of them in the last two years at the faculties of the University of Belgrade, in the broadcasts of the public broadcaster RTS, television of Republika Srpska, Al Jazeera. The rallies held in the packed halls of the municipalities of Petrovac, Paracin and Vlasotince at the request of citizens who oppose the construction of SHPP are also worth

Photograph: Olja Simovic

mentioning. A particularly important gathering was held at SASA (Serbian Academy of Sciences and Arts), on June 6, 2019, entitled "Environmental Impacts of Small Hydro Power Plants", as well as at the Academy of Sciences and Arts of the Republika Srpska. The Academy of Engineering Sciences of Serbia (AESS) adopted the paragraph (February 21, 2019), very critically intoned towards the concept of SHPPs. The opinion of the Dean and Director of the Institute of the University of Belgrade (Biological, Mining-Geological, Geographical, Forestry and Institute for Biological Research "Sinisa Stankovic"), who explicitly spoke against the intended large-scale construction of SHPPs, was noticed in public. Later, this view was supported by the Department of Biology and Ecology, Faculty of Sciences, University of Novi

Sad. The Republic Spatial Planning Agency, in cooperation with the Academy of Engineering Sciences of Serbia, organized a Round Table on the topic "Small Hydropower Plants in Serbia - Problems and Solutions" on June 30, 2011, which identified "problems", "dilemmas" and "solutions", that are very current today. The question remains why nothing has been done between 2011 and 2019 to avoid the problems we still face today? One should not forget the two major protests, non-political rallies against the construction of SHPPs, held on September 2, 2018, in Pirot and January 27, 2019, in Belgrade, attended by thousands of dissatisfied citizens. The state stays clear of this issue because it has generated the problem itself, with a superficial and dilettantish approach to the concept of SHPP construction, which has been exploited by interest groups that benefit from it. The potential of small streams where SHPPs can be built is about 0.6 Mten (megatons equivalent oil), or 4.7 per cent of total electricity production in Serbia, which is a maximalist estimate that often comes down to 2-3.5 per cent. The full implementation of the SHPP concept would mean that more than 2,200 km of watercourses in mountainous areas have been put in pipes, valuable habitats in stream beds would have been fragmented, degraded or destroyed, which would have irreversible, severe consequences for the survival and abundance of already endangered and rare animal populations and plant species. It would also require an average of several thousand kilometres of access roads and corridors of derivation pipelines, mainly at the expense of forest areas, of which a significant part is in protected natural areas. What state can stand behind these facts and ascertain that it is national interest?

EP ***There are generally two mutually exclusive claims in public. The first one is that derivative SHPPs dry up rivers because the biological minimum is not respected, especially in the dry months (the biological minimum is determined by "Srbijavode", and it generally amounts to 15-25 per cent of the average annual flow). The other is that SHPPs only use surplus water and that during the year without precipitation all the water is released into the river. Is there an instrument for verifying compliance with the biological minimum and is there information on how many SHPPs did not comply with it?***

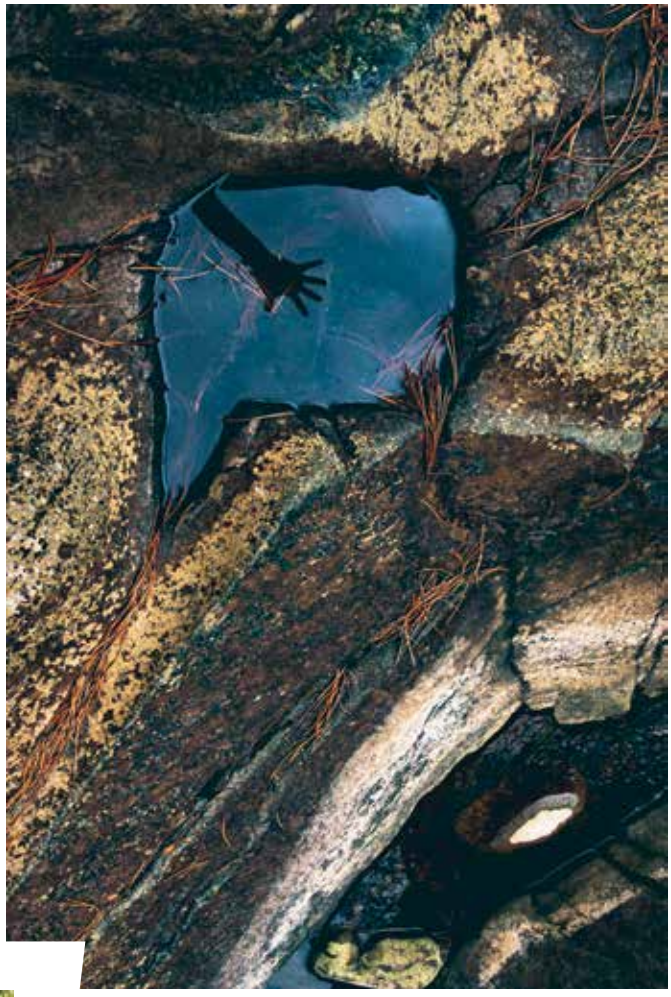
Ratko Ristic "Biological minimum", that is "minimum ecological flow" can be determined only after defining the hydrobiological characteristics of the watercourse, based on detailed monitoring of the living world of the aquatic ecosystem. The monitoring is carried out with simultaneous work of experts in the field of hydrobiology and hydrometry, at least for a year, after establishing a functional link between the necessary conditions for the survival of the living world in the watercourse and the corresponding water levels (flows). Only then can a "biological minimum" or "minimum ecological flow" be determined. As far as I know, in Serbia, in no case was this method used for determining the "biological minimum". It is rather done based on the application of probability calculus or empirical methods, without any consideration of the conditions to be provided for the survival and development of the living world. Also, I am not familiar with the fact that some inspection service controls the release of even such a "biological minimum". To make matters worse, many users and owners of SHPPs do not respect it, but close the fish paths, to let more water into the derivation pipeline, generating more energy and making more money, which has fatal consequences for the living world. If it is any consolation, the situation is similar at many SHPP facilities in the world, which has triggered protests and research in some countries and has led to a drastic change in the attitude towards SHPPs.

EP ***It seems that the impact of the pipeline, which directs water from the riverbed to the powerhouse to produce electricity, to the living world in the river cannot be denied. How do we even know the intensity of this impact of any of the SHPPs?***

Ratko Ristic It is simple to determine this based on appropriate hydrobiological studies, which should be carried out systematically on all streams with SHPPs. Research conducted by Professor Predrag Simonovic (Faculty of Biology, the University of Belgrade) shows that there has been a drastic decline in the biomass of brown

Photograph: Nenad Prodanović

trout populations on Josanicka River, Vlasina and Resava, where SHPPs were built. At the same time the amount of biomass increased on Lomnica, Zlotska River and Rasina, where there are no SHPPs. In our case, only one species has been researched, and there is still no research addressing other species, impacts on the ecosystem, as well as the cumulative impacts of building multiple SHPPs on a single stream. Many studies conducted in Slovenia, Germany, Austria and the USA show similar results.



EP ***Is the preparation of an Environmental Impact Assessment study mandatory for all SHPP facilities? What exactly is determined by the study, what are the parameters being checked and is it true that, for example, the design of fish paths is not defined by law, which leaves the potential for adverse effects on biodiversity?***

Ratko Ristic The development of Environmental Impact Assessment studies is often only to support the activities of investors, who hire and pay processors. The results of the analysis generally show that there are no expected negative impacts. Responsible design of the Study requires extensive and costly previous research, with complex analysis, an example being the Canadian Technical Report of Fisheries and Aquatic Sciences (Clarke et al, 2008). Even locating strictly protected species at the project site does not produce a reaction by the competent institutions to interrupt all activities, in accordance with Article 4 of the Rulebook on the Declaration and Protection of Strictly Protected and Protected Wild Species of Plants, Animals and Fungi (RS Official Gazette, No. 5 / 2010, 47/2011, 32/2016 and 98/2016).

The modification of the Regulation for the establishment of the List of projects for which an environmental impact assessment is mandatory and the List of projects for which an environmental impact assessment may be required (Official Gazette of the Republic of Serbia: No. 114/2008) defines the obligation to develop an Environmental Impact Assessment Study, only for SHPPs having more than 2 MW of installed capacity. Therefore, for all SHPPs with a capacity of less than 2 MW, it is not necessary to produce the Study. Practically, the largest number of SHPPs in Serbia, outside the protected areas, is exempted from the obligation to design the Impact Assessment Study. At the same time, many studies have been created without elementary monitoring of the living world and represent explicit support for investors' intentions. Further modifications of the legal regulations followed: The Decree on Protection Regimes (Official Gazette of the Republic of Serbia, No. 31/2012) introduced the novelty that SHPPs with installed power up to 5 MW can be built in protected areas in the second degree of protection. As planned and built SHPPs in Serbia have the installed capacity mainly in the range of 0.1-0.5 MW, rarely more than 1 MW, this decision has opened the door to investors in the areas of protected natural areas. It is difficult to believe in the spontaneity of these changes, especially since there is no rational explanation other than an emphasized "understanding" of the interests of investors.

A survey conducted by the Faculty of Forestry, the University of Belgrade (2018) at 46 SHPP facilities in Serbia found, among other things, that: 40 have a fish path and six do not; 20 fish paths are completely dysfunctional (denivelation of the troughs and fish paths on the downstream side was observed on 4 objects; respectively, the difference in height that fish could not overcome; 6 objects were covered with drift and branches; 6 objects were blocked on

Photographs: (top) Tijana Jevtic; (left) Zorica Obradovic

the inlet profile; on 4 there is a small amount of water registered); no movement of fish was observed on 20 conditionally functional fish paths. It is indicative that virtually none of the fish paths at the surveyed facilities in Serbia are functional, which is an indicator of a worse state than in the world, where only 10 per cent of fish trails identify as a possible trajectory of movement, and only 5 per cent meet the criteria for efficient movement, according to research conducted in Germany, Austria and the USA (Eichelmann and Scharl, 2017; https://www.lachsverein.de/; Zitek et al., 2007; Brown et al, 2013; Noonan et al, 2012).

EP ***How many SHPPs were built in protected areas? What additional permits are required for the construction in areas like this?***

Ratko Ristic During a research conducted by the Faculty of Forestry, the University of Belgrade in 2018, it was determined that 14 SHPP facilities are located in protected natural areas (National Park Kopaonik -2; Nature Park Golija -5; Nature Park Stara Planina -1 ; Special Nature Reserve "Goc-Gvozdac" -1, Strict Nature Reserve "River Resava gorge" and Strict Nature Reserve "River Suvaja gorge -1"; Strict Nature Reserve "River Resava gorge"-1; Landscape of outstanding features "Kamena Gora"-3). Sixteen powerhouses and seventeen water intakes are located less than 1 km from the boundaries of the protected areas. The envisaged large-scale construction of SHPPs in the most valuable protected natural areas of Serbia completely invalidates the concept of "protection" due to irreversible, adverse effects. The construction of the SHPP starts with the construction of a water intake structure (dam), which divides the watercourse, followed by the installation of a pipeline to the powerhouse with turbines. In most cases, it is necessary to intersect access roads to the construction site, remove forest cover and destroy the surface layer of soil. The occurrence of straight glade forming in pine cultures was noted on serpentinite, aged 30–40 years, for the need of the construction of transmission lines from the SHPP powerhouse to the transmission network hub. Pine cultures have been formed for the protection against erosion and as flood prevention, biodiversity restoration and mitigation of local climatic extremes, as objects of great public importance. Installation of the derivation pipeline is often done in the watercourse or at elevations below the level of calculated high water (which is contrary to the issued conditions and opinions of the competent state institutions). During the laying of the derivation pipeline, there is often complete destruction of the natural watercourse and destruction of the habitat, due to the movement and operation of heavy machinery on sections of several kilometres each. Also, contractors arbitrarily divert water flow, leaving the natural trough without water, completely neglecting the exceptional value of the aquatic ecosystem, even in protected natural areas. On the built SHPPs, the occurrence of closing the inlet profiles of fish paths was observed, so that there was no water in them, or branches and silt completely covered them. An illustrative negative example of so-called "planning" is the Nature Park Stara Planina, where 58 SHPPs are planned to be built. Also, the role of the Institute for nature conservation of Serbia, which issues the conditions of nature protection, as a necessary part of the documentation for protected areas, is disputed, in the absence of consultations with the managers of protected areas.

EP ***What has changed in our country and the world since the Cadastre of SHPP (which defined 856 potential sites for the construction of SHPP with a total capacity of 450 MW) in 1987? Do today's SHPPs problems arise partly from the implementation of this outdated document?***

Ratko Ristic Numerous administrative procedures were started by referring to the Cadastre of Small Hydropower Plants (from 1987), which was never adopted as an official state document, which caused a lot of problems. Since 1987, there have been drastic modifications of the hydrological regime on numerous small watercourses, and during the design of the so-called Cadastre, no one considered nature protection.

EP ***At what point is the impact on the natural environment considered during the construction of the SHPP?***

Ratko Ristic It is envisaged that the appropriate inspection services monitor the process of construction of SHPP, from the beginning through all phases, until completion (construction, ecological, forestry, and water management inspection), and to record all irregularities, which they partially do. However, there are numerous examples where inspections do not act on reports or respond inappropriately (cases of laying pipelines in riverbed for high water and removing coastal vegetation in sections of several kilometers, which is explicitly prohibited; perforating barriers to install pipelines; diverting water flow from the natural trough; self-willed change of intended construction sites; construction of access roads without evacuation bodies for surface water, which thus become a source of erosion material and accelerate the formation of flood runoff; destruction of habitats of strictly protected species.)

Photograph: Olja Simović

EP ***The Ministry of Environmental Protection of Serbia recognized the problem while pointing out that the way individual SHPPs were built had extremely damaging effects on the ecosystem. However, the construction of SHPPs is not within the competence of this Ministry. What should be done with built and partially built plants, and what about those that have all the permits and have not yet begun with the construction?***

Ratko Ristic The key ministries that should participate in this process are The Ministry of Mining and Energy, The Ministry of Construction, Transport and Infrastructure, The Ministry of Agriculture, Forestry and Water Management and The Ministry of Environmental Protection. They should do the following:

- Review the applicable provisions of the Energy Law and the National Renewable Energy Action Plan;
- Prohibit the construction of small hydropower plants in protected natural areas of RS;
- Abolish incentives for electricity produced from SHPPs with derivation pipelines;
- Achieve consistent respect and supremacy of the Law on Nature Protection in relation to the Law on Planning and Construction, when it comes to protected natural areas;
- Provide a mechanism for respecting the hierarchy of spatial planning documents;
- Remove from the spatial planning documents for protected areas all sites for the construction of small hydropower plants;
- Introduce an obligation to create Environmental Impact Assessment Study for all SHPPs, regardless of the installed capacity and location (protected or unprotected areas);
- Introduce the obligation to directly invite (notify) the manager of protected natural resources to public hearings on the drafted Studies, with the mandatory submission of an integral version of the Study at least 30 days before the public hearing;
- Disable the issuance of nature protection conditions without the consent of the protected natural resources manager and the Ministry of Environmental Protection;
- Prescribe an adequate methodology for determining the "biological minimum", i.e. "minimum ecological flow" with mandatory prior research;
- Expand the authorization, capacity and dignity of inspection services and significantly intensify penalties for non-compliance;
- Explicitly prohibit the installation of derivation pipelines in minor riverbeds and the destruction of coastal vegetation;
- Provide an effective mechanism for controlling the biological minimum discharges on constructed facilities;
- Review the permits issued so far for the construction of SHPPs in order to determine the legality of the procedures implemented;
- Ensure the participation of local people in the process of issuing conditions, opinions, approvals and permits concerning SHPP.

In addition to prohibiting the construction of new SHPP facilities in protected natural areas, the legality of procedures permitting the construction of existing ones should be monitored. Those constructed facilities that are in a collision with the law and have a visibly negative impact on the ecosystem should be removed, and those that are legally constructed should be subject to strict control of the operation. Those investors who have proper permits for the construction of SHPPs in protected areas, in accordance with legal solutions and have not yet begun construction, should obtain alternative locations outside the protected areas provided by the state, or be adequately compensated. Generally, it is necessary to prohibit further construction of SHPP facilities in protected areas as soon as possible.

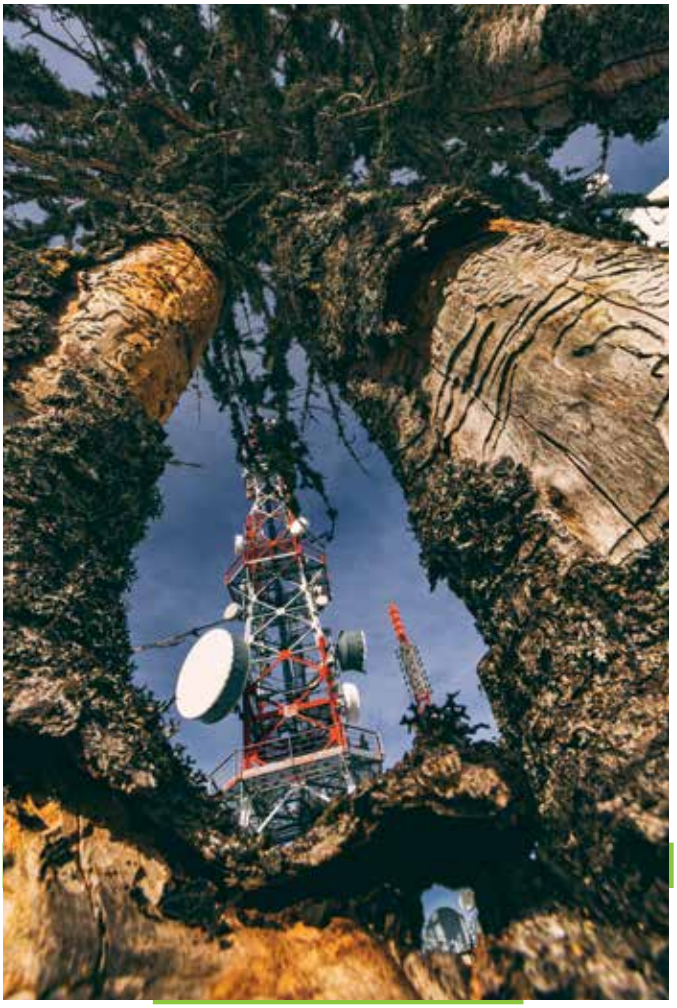
EP ***Is it sufficiently heard in public that out of 120 SHPPs, in only a small number of cases environmental consequences were noted?***

Ratko Ristic First of all, it is not true that environmental consequences have been reported in a small number of cases, on the contrary. Take a look at the results of a survey conducted by the Faculty of Forestry, the University of Belgrade, conducted on 46 sites (in 2018). More extensive and more severe consequences would probably be identified if all the SHPP facilities in Serbia were surveyed.

EP ***Everyone agrees that we need energy from renewable sources. However, while proponents of SHPPs, primarily gathered in the National Association of Small Hydropower Plants, who consider hydropower plants the ideal solution for stable production, the least CO_2 production of all RES and the longest lifetime, point out that no inspections have recorded any irregularities in the work of SHPPs in their association, the opponents cite the extremely small share that SHPPs have and that all 856 planned SHPPs can have in the energy mix with a negative impact on the environment, as documented by striking images from Rakita. Why are their attitudes so different? What did we miss hearing about the expansion of SHPP construction?***

Ratko Ristic Attitudes differ because apologists of the SHPP concept have a clear material interest, not shared by their opponents, whose motive is the ultimate protection of Serbia's natural values, above all the very fragile aquatic ecosystems of the mountainous area of Serbia. The number of dissatisfied citizens and the various forms of protest against the construction of SHPPs speak very deeply about

the profoundness of the differences. Thermal power plants indeed emit CO_2 and various types of pollution, but they are also the basis of our energy stability, which for the time being has no suitable alternative. It is also true that large hydropower systems have certain negative environmental impacts. Still, it is also true that they produce vast amounts of energy and serve the interests of millions of Serbian citizens. Likewise, there are other renewable energy sources (solar parks, biomass, geothermal energy, wind farms) that have not been seriously considered or used so far. Wind farms interfere with migratory bird trajectories and drain the soil, reducing its fertility, and these are negative effects, but with far less intensity and less spatial coverage than SHPPs. Although we do not have any solar parks, there is no initiative to implement a project to install 50,000 solar panels on the roofs of individual residential buildings, which would serve to heat water for household purposes. How much would electricity consumption be reduced in this way? Serbia has tens of thousands of hectares of unproductive agricultural land (due to salinity, high groundwater levels or compaction), on which it is possible to raise "energy" plantations, e.g. willow (Salix viminalis, Inger clone), which has a yield of 70-100 t/ha per year and enables the preparation of wood chips for cogeneration plants where heat and electricity are produced. These plants are built where there are raw materials. It would ensure the



production of significant amounts of energy from biomass while protecting forest ecosystems. The electricity produced at the SHPP is delivered to the Electric Power Industry of Serbia (EPS), which pays the preferential price to producers from 10.6 to 13.93 euro cents per kilowatt-hour of delivered energy, all of which is ultimately paid by the citizens because the electricity bills are burdened with 0.093 dinars per kilowatt-hour spent in every household in Serbia. In addition, technical and non-technical losses of EPS in 2013 were 14.9 per cent. According to World Bank data for 2014, Serbia has a loss of 15.44 per cent, which is very similar to Croatia (13.1), significantly more than BiH (8.18) and worryingly more than China (5.5), Belgium (5.43), Austria (5.3), Czech Republic (4.52), Finland (4.1), Cyprus (4), Germany (3.9) and Iceland (2.57). Tolerant technical losses at the European level are 5.5 per cent, so the question is, where does almost 10 per cent of electricity produced in Serbia disappear? Should the losses in the transmission and distribution networks be reduced by only 2 per cent, the preserved amount of energy would eliminate the need for SHPPs. Continued construction of SHPPs to reach the planned number (856) would lead to severe ecosystem disturbances, environmental degradation and would be an indicator of the inability of the system and the wider community to see the self-destructiveness of this form of behaviour in public life. It would mean, among other things, denying the fundamental human right to every citizen of the Republic of Serbia to use Serbia's unique natural values throughout his life and preserve them for future generations.

Interview by: Tamara Zjacic

Photographs: Tijana Jevtic

BALTHAZAR FROM FRUSKA GORA

For some passers-by, Milivoj Pejin's house in Sremska Kamenica is a seemingly ordinary family home that does not differ from its surroundings. More informed people are aware that this is not the case because the basic building material of this house is straw. The third group of people is we who have had the opportunity to go inside. Stepping inside Milivoj's thatched walls, we felt as if we had entered the portal to the world of the unusual inventor Balthazar from the cartoon of the same name. There are a lot of similarities between him and our host, and you will conclude from the following lines which similarities are these.

Milivoj Pejin is a retired traffic engineer. He spends his leisure time perfecting several different inventions. He pro-

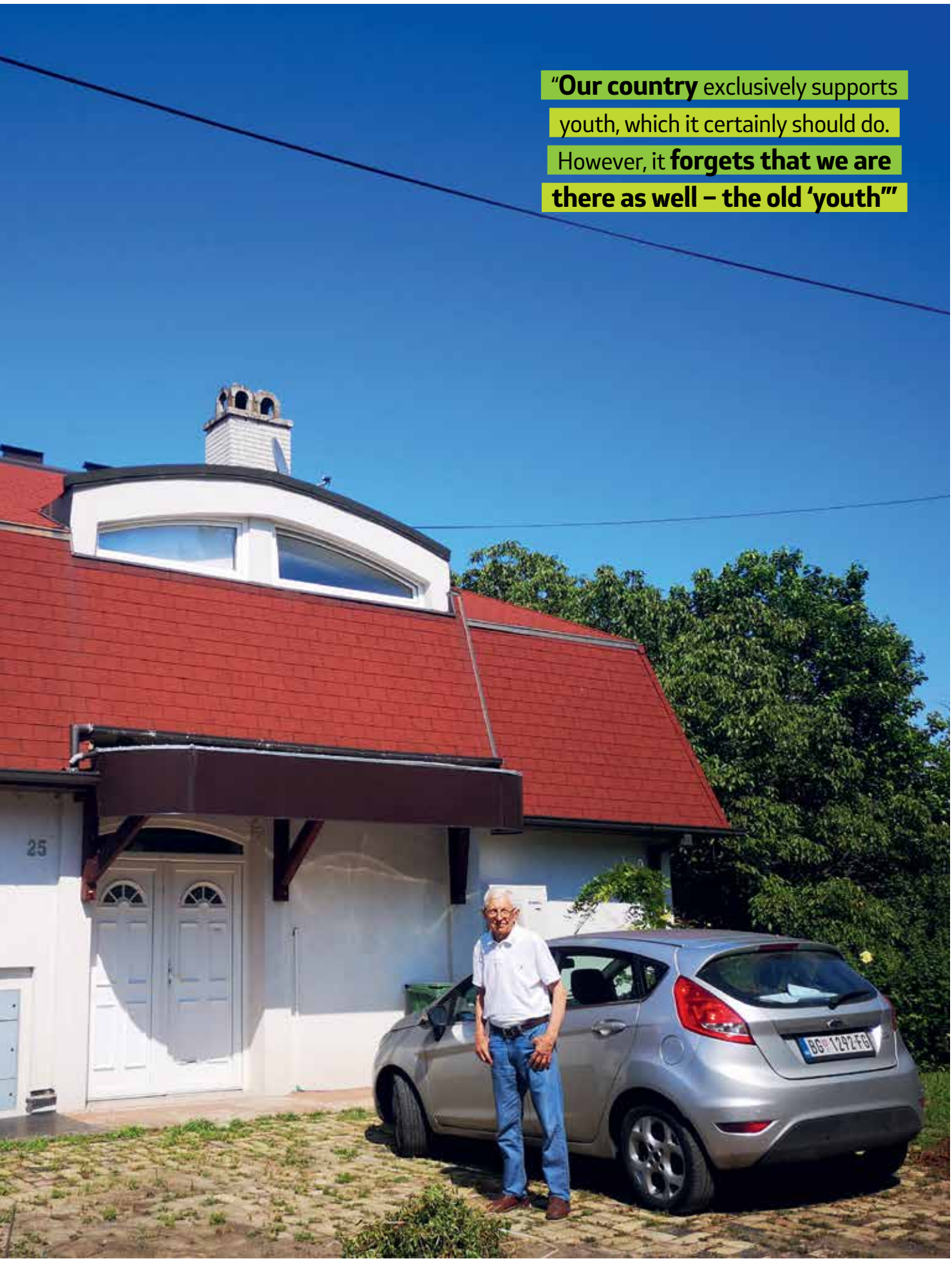
LIVING IN A HOUSE OF STRAW

Although the electrical conductor was the main motive for our visit to Milivoj and his wife Paulina, we couldn't resist talking about the topic of living in a house of straw. The first association for a house of straw takes us straight into the world of the famous fable where a naive pig tried to make his home out of this material. Milivoj's family is proof that people between thatched walls, in reality, are safer than in the imagination of the unknown author of the fable mentioned above.

The foundations of the house were first created in the mind of the owner, thanks to the inspiration awakened by artisans from France who favoured this type of natural construction.

"I am surprised that this type of construction is not more common in our country! We have straw, we throw it away, we burn it, and the richer nations of the world build homes from it, and even families alone are doing it without any worker. Kids mix calx, straw and mud, women carry buckets with that mixture... One does not need any investments. We, on the other hand, build the most expensive houses - made of concrete," Paulina emphasizes.

Firsthand, we also learned that the belief that primary enemies of straw objects are rodents and insects is a false one. The Pejins have not been in trouble so far!


"Our country exclusively supports youth, which it certainly should do. However, it forgets that we are there as well – the old 'youth'"

The electrical conductor is one of a kind apparatus for warming air by free circulation which is, according to its conceptual creator, entirely better than the competition in the market.

Industrial production would **lower the production costs** of electrical conductor

INNOVATION IS LEARNED THROUGH PRACTICE!

"Our country exclusively supports youth, which it certainly should do. However, it forgets that we are there as well – the old 'youth'", Milivoj notes. "A person is not born as an innovator, nor can he graduate from school to become one, this is simply not the right order of things," he continues, concluding that innovation is learned through practice.

Milivoj is also explicit in the view that something is new only if it is different, which is supported by the following argument: "And those who do PhDs must come up with something previously unknown to earn a doctorate!"

In his view, however, the biggest problem is that innovators do not have their place in the law. "All other obstacles come from this, and above everything the lack of financial resources," Milivoj says. His colleague Vladan Petrovic from Badovinci, who developed the solar heating plant, is facing the same problems, as well as the many others.

tected five or six of them. However, due to the high cost of retaining that right on an annual basis, Milivoj is forced to give up patents one by one. He will not give up the one he has the most faith in, under no circumstances.

The device in question is a so-called electrical conductor, one of a kind apparatus for warming air by free circulation which is, according to its conceptual creator, entirely better than the competition in the market.

"First of all, it's better because no heating device has such a constructed heater. Three sheet heaters with individual power of 1 kW are installed between the perforated aluminium sheet metals. They draw electricity in cycles with lower hourly consumption, but still sufficient for the warmed-up heater to deliver more energy than the heaters used in cycles. It allows the application of two bimetallic thermostats that maintain the heater's temperature between 160 and 200 degrees Celsius. With one heater it can deliver 153 kg/m3 per hour, and with three heaters in the same conditions less than 200. This device does not save but makes maximum use of the available electricity from the distribution, and electrical and mechanical design solution of the machine enables the delivery of power, more than the amount consumed," our interviewee reveals, adding that the electric conductor weighs 6 kg.

"The parts cost around 35,000 dinars, and it takes approximately five hours to assemble them. If these activities were done industrially, the cost of production would be lower. However, given the effects generated by an electrical conductor compared to the existing devices, its sales price could be higher if financial mathematics were applied," Milivoj points out.

He did not forget the role of his friend Branko R. Babic in the creation of an innovative device. The two enthusiasts met ten years ago at a Tesla fest in Novi Sad. Milivoj then complained to Branko that he was unsuccessfully trying to develop a heating system that would be cheaper than a market offer. The friend offered him to use his contrivance - perforated aluminium sheet metals, as a starting point. They are now the essence of not only the electrical conductor but also Milivoj's versions of air condition without compressor, computer coolers and solar collectors.

Even though we were visiting the Pejin family during one hot June day, the inventor wanted to show us how the electrical conductor works, so we simulated optimal laboratory conditions in the basement of the house.

Equipped with a notebook, a pen and a temperature gauge, we closely monitored the performance of the apparatus. The inlet air temperature was 22 degrees Celsius, and the outlet air temperature was 160 degrees Celsius.

By recording the key values and incorporating them into the appropriate formulas, we calculated that in the given circumstances, work of an electrical conductor, with one heater on, would result in more than double energy savings. We have concluded that within 24 hours, the electrical conductor would only consume 18-kilowatt hours and deliver 40-kilowatt hours.

"That way a kilowatt-hour would cost half as much, no matter what EPS cost zone the household is in, which is a significant economic contribution," Milivoj explains. He then flatteringly told us that in an hour, we had perfected our skills enough to carry out similar experiments independently.

In the end, the only question is whether, after reading our report from the slopes of Fruska Gora, the comparison we used in the introduction is clearer to you.

Prepared by: Jelena Kozbasic

Photographs: (bottom) Unsplash/Justin Kauffman; (all others) Energetski portal

GREEN PRIORITIES OF BELGRADE

Is there a climate strategy for Belgrade and what could be done to make life in the capital better, we asked Milena Vukomirovic, PhD, Assistant Professor at the Faculty of Forestry, whose subspecialty is precisely urban design

The consequences of climate change and global warming are becoming more pronounced in urban areas, and the problem is even greater due to the fact the cities, to a large extent, generate local weather conditions and thus significantly affect the quality of life of their citizens. In this sense, Belgrade shares the fate of the European capitals. Still, unlike the others, it is quite far from a comprehensive approach to dealing with the problem, although there are many ways to cope with global warming, points out Milena Vukomirovic, PhD.

EP ***How vulnerable is Belgrade in terms of climate change and what is the biggest problem?***

Milena Vukmirovic Belgrade is extremely vulnerable in terms of climate change, which is primarily reflected in high temperatures during summer period, the increase of floods as well as the increase in the intensity and frequency of storms, as it is documented in the Climate Change Adaptation Action Plan on from 2015 developed by the team of people employed at the Secretariat for Environmental Protection of the City of Belgrade. Key problems that can be singled out are the lack of greenery and the use of solid and non-porous surfaces in paving in densely populated parts of the city, inadequate protective levees in parts of the city prone to flooding, poor condition of the facilities in terms of energy efficiency, a high percentage of private cars users that contributes to the increase of greenhouse gases and other.

EP ***In recent years, many panel discussions and conferences have been held on this topic which attended numerous experts, representatives of state bodies, NGOs... Can we say that, in a way, administration of Belgrade has been working on its climate strategy?***

Milena Vukmirovic Discussions, conferences, panels, written reports, some public policy document and that's it. In my opinion, we are still far away from the general acceptance of the need to deal with this major problem, to which we generally refer only when the temperature exceeds 37°C

Milena Vukmirovic, Assistant Professor at the Faculty of Forestry

MILENA VUKMIROVIC holds a PhD from the Faculty of Architecture in Belgrade and has been dedicated to urban design for many years as an Assistant Professor at the Faculty of Forestry, but also as a former Advisor to the Chief Urban Planning Officer of the City of Belgrade in the design of open public urban spaces. She is the author of two monographs of national importance, several chapters in monographs of international importance, and dozens of papers published in national and international journals. She is currently engaged in the national scientific project "Modernisation of the Western Balkans".

Photographs: (background) Unsplash/Nikola Knezevic; (Milena) courtesy of Milena Vukmirovic

or when the Sava floods Obrenovac. Of course, I know a lot of people who seriously and responsible deal with climate change issues, such as colleagues from the Secretariat for Environmental Protection of the City of Belgrade, the Ministry of Environmental Protection of the Republic of Serbia, my colleagues from the Faculty of Forestry, the Institute of Architecture and Urban Planning, the Institute of Public Health of the city of Belgrade, but these are still lonely initiatives, although this should be one of the priority goals.

EP ***Given the fact that you were the Advisor to the Chief Urban Planning Officer of the City of Belgrade for four years, can you tell us which activities the city undertook in order to ensure sustainability in the current climate conditions but also in perspective?***

Milena Vukmirovic One large group of activities, conducted by Milutin Folic, who until recently was the Chief Urban Planning Officer of the City of Belgrade, and his team, was based on the principles of applying the concept of sustainable urban mobility and introduction and promotion of environmental awareness and the idea of the necessity of sustainable and natural environment as a precondition for the development of the city. This is how the IME project Identity_Mobility_Ecology was created, a kind of an action plan which included 20 subprojects, which among other things included the expansion of the pedestrian zone of Knez Miha-

ilova Street, introduction of bicycles in the public transportation system, façade renovation according to the principles of energy efficiency and the arrangement of open public urban areas that would increase the intensity of spending time outdoor, the rate of pedestrians, planting of trees... Although the projects were very well accepted at the beginning, their implementation did not go in the expected direction. Here, I am primarily referring to the arrangement and the change of traffic regimes in certain streets, the construction of bicycle lanes, and the establishment of a bicycle renting system, the establishment of the Fund for energy efficiency of the facilities, greening and landscaping.

Photographs: (left) Unsplash/Alexander Mils; (bottom) Unsplash/Martin Reisch

EP ***How important is the design of public urban areas, which is something that you specifically deal with, for the reduction of the greenhouse effect and cleaner air in Belgrade?***

Milena Vukmirovic The design of open public urban areas is of great importance for the reduction of greenhouse gas and pollution, not only of air but also of land, water, noise, biodiversity and more. Particular attention in the context of climate change should be given to comfort, as this criterion can improve the quality and length of time spent outdoors. In this way, the microclimatic characteristics of the environment are also affected, i.e. they regulate temperature, wind drift, emissions of harmful gases and unpleasant sounds, reflection and more.

As for Belgrade, it should start with an umbrella document that will thoroughly and responsibly address the challenge of designing open public urban spaces and implementing the concept of green infrastructure. And, of course, to start with the realisation.

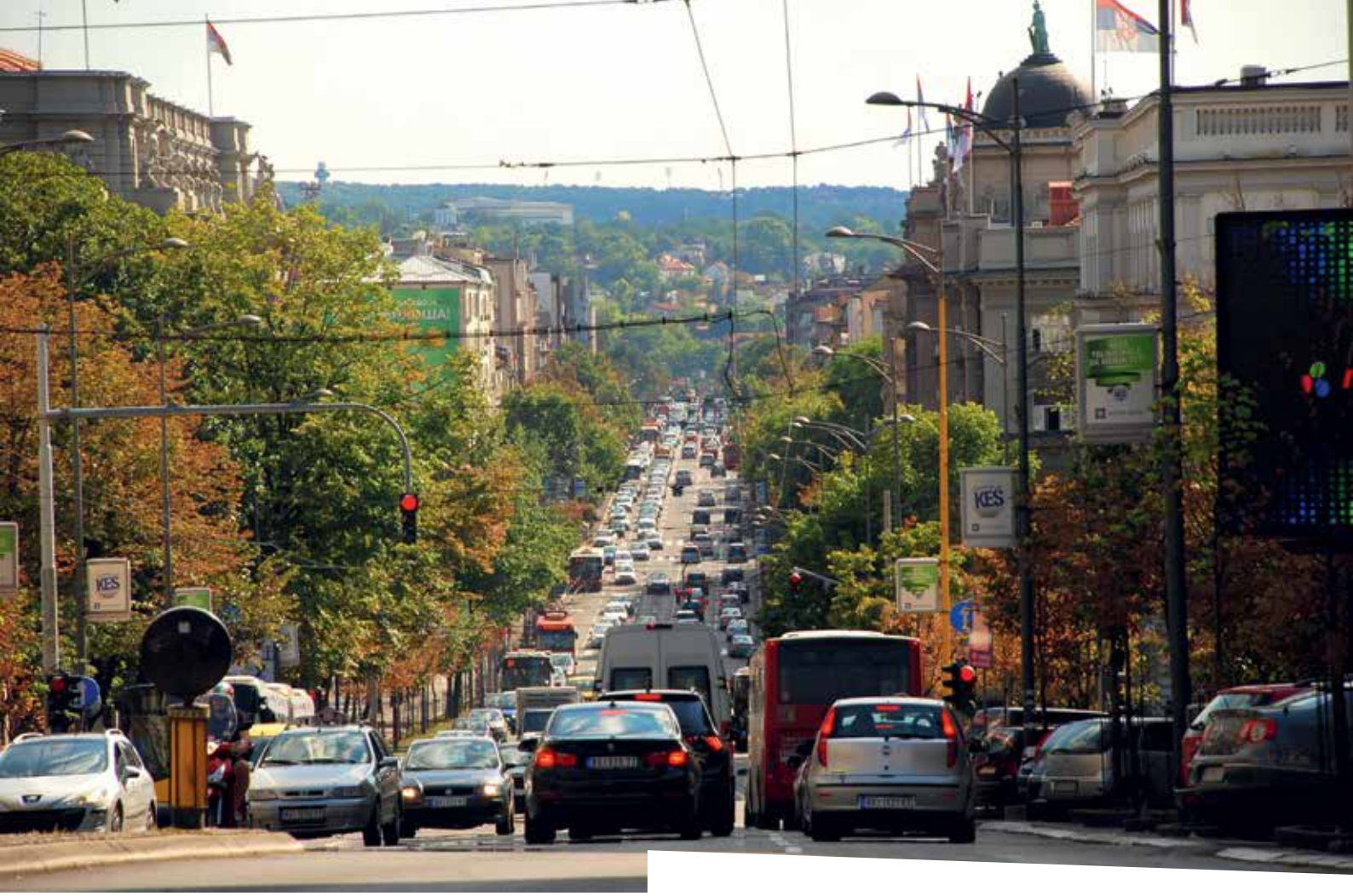
EP ***Green and sustainable architecture are an integral part of urban design today because they can mitigate the effects of climate change. To what extent is this kind of architecture applied in our country?***

Milena Vukmirovic Green and sustainable architecture are evolving at a rapid pace and encompassing much, from applied materials, smart systems and installations, space organisation, facility orientation and its shape to the climatic and natural features of the environment. In the developed countries, when building a facility, special simulations of the facility are performed, at the city level and individual urban units by using a virtual model of the city, to perceive all possible problems and impacts that can be timely overcome as early as the project development phase. I am afraid that the application of green architecture standards still depends on the investor himself. They mostly claim that it raises the price of the square meter while neglecting the long-term effects, such as a price reduction due to reduced energy consumption for heating and cooling purposes.

EP ***Vienna is often referred to as a European metropolis that can serve as a role model to Belgrade in urban terms. What can we learn from Vienna?***

Milena Vukmirovic Vienna is far ahead of us. According to my rough estimate, at least some 30 years. But when it comes to what we can learn from Vienna and adapt it to our needs, it is first and foremost an attitude towards citizens, for whose benefit the entire city government and the state work. However, here I would single out their urban development strategy "Smart City Wien", which is an integral document that has been carefully worked on for several years and involved in the process by all citizens of Vienna through various activities. In this way, it became a common vision of all citizens. The main objective of this strategy, which will be implemented by 2050, is to cite "the best quality of life for all inhabitants of Vienna while minimising the consumption of resources. It will be realised through comprehensive innovation". And as can be concluded, concern for citizens and energy and climate goals are the leading determinants of development. Applying at least this

Photograph: Unsplash/Anna Hunko



methodology for drafting one strategic document would be a good start.

EP ***Green roofing in recent years has been a trend in almost all developed countries. Is it likely to become binding in some way in Belgrade?***

Milena Vukmirovic Green roofing, as well as urban gardens, represent one resource that has been underutilised in Belgrade. Initiatives are in place, but there is still no major city-wide comprehensive plan addressing this topic.

EP ***How can Belgrade citizens contribute to a better environment and pollution reduction and how much can the city help them with it?***

Milena Vukmirovic It is highly recommendable to talk to citizens. It is not something to shy away from. Politicians often avoid this practice because they feel that it will unnecessarily prolong some processes, and their terms last for four years anyway, so it is continuously a race against time. However, a conversation brings up ideas. Belgrade citizens, on the other hand, need to be a little more talkative, not to ignore the invitation to workshops, and to take initiatives. In terms of walking and public transport, the situation is very good, but I can say that we are behind the times in comparison to some more developed cities. The trend is now somewhere for the rich to ride a bicycle, a scooter or to walk, while here it is still important for us to "get" an expensive off-road vehicle and drive around the city alone.

Prepared by: Gordana Knezevic

Photographs: (top) Unsplash/Yang Jing; (middle right) Biljana Gadjanski; (bottom left) Unsplash/ng-n

FAREWELL TO LONG CHARGING AND SHORT RADIUS

Cities around the world face the challenge of finding solutions for public transportation that can reduce harmful gas emissions and noise, and at the same time reduce operating costs to a minimum. With increasing levels of air pollution and a stronger effort by the community to have eco-friendly and clean transportation, electric city buses are an ideal chance for improvement of urban life. The ABB's automated rapid charging system allows zero CO_2 emissions on public transport and city bus 24/7 continuous movement. Long bus loading times and short radius of motion belong to the past.

Overnight charging

Overnight charging allows e-buses to be connected and charged while parked at the bus depot. Chargers can be configured to offer 50 kW to 150 kW of high-power fast charging. A single 150 kW charger charges up to 3 buses reducing the total charge load from 450 kW to 150 kW.

Characteristics:

- In an overnight session (6 hours) three 300 kWh buses can be fully charged
- Very cost-effective solution with the introduction of three charge boxes with low-cost maintenance
- Ability to remotely "wake up" buses for top-up charging (100% SOC) and heating & air conditioning
- Supporting all open charging standards globally (CCS and OCPP compliant)
- Flexible design for the roof and floor mounting
- Remote diagnostics and management tools

Opportunity charging

OppCharge is an automated, fast-charging system, which allows electric city buses to drive 24/7, thus enabling true zero-emission public transport in cities. With its automated rooftop connection and a typical charge time of 3–6 minutes, the system can easily be integrated in existing bus lines by installing chargers at endpoints, terminals and/or intermediate stops.

Characteristics:

- Charge electric buses in 3–6 minutes
- Easy integration into existing bus lines
- Automated 4-pole rooftop connection
- Based on international IEC 61851-23 standard
- Safe and reliable connection
- Remote diagnostics and management tools
- Modular system
- Power available from 150 kW to 600 kW

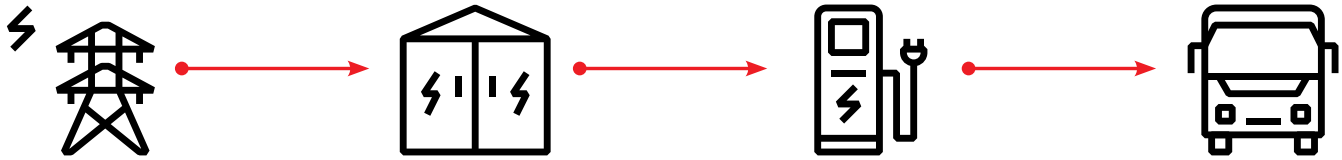
Flash charging

The solution called TOSA looks like a regular trolleybus, except when you look on the roof. Instead of the usual trolley poles to overhead lines, this e-bus has a controlled moving arm that connects, in less than a second, to an overhead receptacle integrated into the bus shelter. The high-power flash-charging technology is activated and feeds the onboard batteries to 20 seconds as passengers are getting on and off the bus.

The bus wastes no time and is ready to leave. TOSA is developed for high-frequency bus routes in key urban areas that carry large numbers of passengers at peak times.

- Same time table, frequency, the quantity of passengers and buses as diesel fleet
- Energy storage for peak shaving can be proposed according to local grid requirements and line operation

ABB entered the market of electric vehicle chargers in 2010. So far, it has sold more than 10,500 high-speed ABB's DC chargers in 76 countries all around the world – which is more than any other manufacturer. Based on this experience, ABB has created an exceptional high-power electric vehicle system which has many advantages. ABB chargers are used in production plants and control facilities around the world, including extreme environments such as those



in the Arctic and deserts. Many of ABB's chargers are used 24/7 for intensive testing, 360 days a year by car and bus manufacturers such as BMW, Volkswagen and Volvo Buses. Fortune Magazine has recently ranked ABB eight in the list of "world changing" companies, due to the progress it has made in e-mobility and the charging of electric vehicles.

Characteristics:

- Fully automated fast charging stations installed at some bus stops
- Catenary-free operation
- 20-second charging time
- Short-range and cost-optimal onboard batteries
- Battery capacity from 70 to 130 kWh
- Solution for 18 and 24 meters buses
- Zero-emission mass transit solution
- No communication required between infrastructures and buses the

Photographs: ABB

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THE 50TH INTERNATIONAL HVAC&R CONGRESS AND EXHIBITION

TOWARD CONGRESS ANNIVERSARY

In 1969 and 1970, in three republicas' centres of the former Yugoslavia, three conventions were held about the same area of expertise. The common denominator of those professionals' seminars in Zagreb, Ljubljana and Belgrade was air conditioning.

The Belgrade seminar, on the initiative of Djakovic, PhD, president of the SMEITS (Serbian Union of Mechanical and Electrical Engineering) and professor at the Faculty of Agriculture, was prepared by Assistant Professor of the Belgrade Faculty of Mechanical Engineering, Branislav Todorovic.

The success of the seminar and the exchange of opinion between experts that followed led to the conclusion that the work the organizers had taken up isn't over with that seminar. A circle of experts was formed, and under the SMEITS, they founded the Society for HVAC (heating, cooling and air conditioning). As one of their first tasks, they set to regularly inform members and the community of experts about the Society's activities. The best way to achieve that was actually the launch of a specialized magazine that was brought to light in November 1972.

Seminars (Congresses) about HVAC

Over the next ten years, the seminar became the congress which was more suited to the nature of this manifestation. The exhibition of equipment and achievements was an integral part of the event, and it was on display in front of the hall where the Congress was held. The number of exhibiting companies, that are also sponsors of the seminar and co-publishers of the "KGH" magazine, was growing year by year. In addition to local companies from all over the former Yugoslavia, the number of foreign companies or their representative offices in the country was increasing. The totality of participants and seminar papers was becoming more significant, so very soon after the opening of the Sava Center in 1977, Congress got a new "home" where it is still held today.

The "first among equals" of the Belgrade HVAC Congresses professionals and his memories

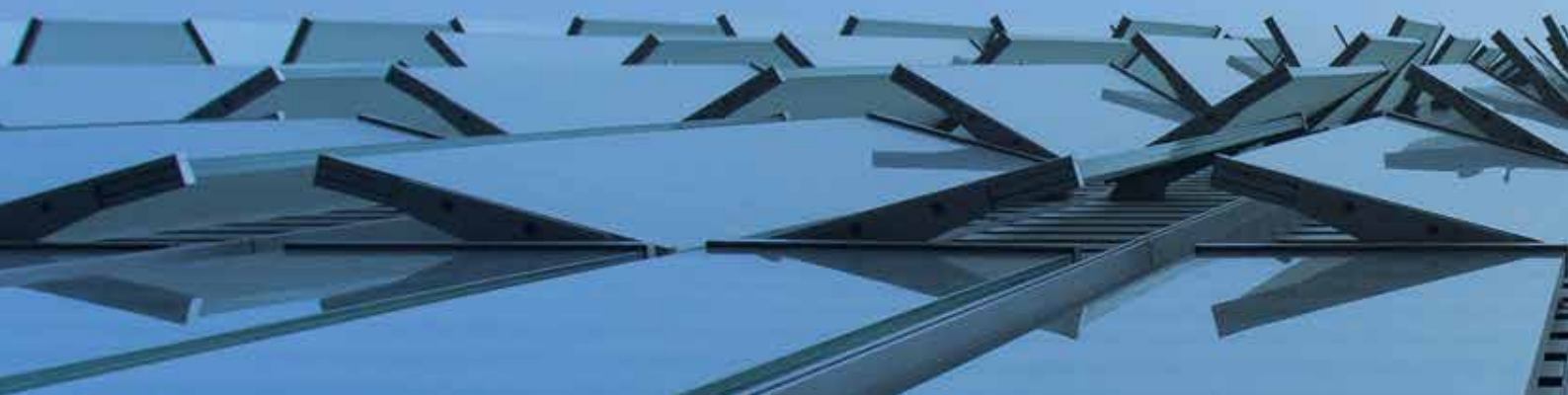
One of the founders of the Serbian Society for HVAC and Congress, as a continuing institution which follows the development of this profession for 50 years now, Professor Branislav Todorovic, PhD, was chairman of the Organizing Committee and the jubilee of the 30th Congress. At the conference opening, in December 1999, professor Todorovic also described some famous moments from previous congresses, including the one that was taking place at that moment.

"Organization of the first convention about heating, cooling and air conditioning, 30 years ago, was our response to the actuality of air conditioning, which by the middle of this century has experienced its previously unprecedented development and application. It was feedback on the arrival of incredible, well-designed air-conditioning appliances, systems and plants which were not only followed but propelled, with its constant optimizing and new options, by cooling technique and above all, by automation regulation technique."

As the world was changing, the profession was developing

In the mid-twentieth century, thanks to the general progress in science and technology, the industry was adopting the latest production technologies that required rigorous controls of the environment parameters, as a prerequisite for the proper functioning of the production process, but

> "The Congress exhibition allows for the flow of information that is very important in our profession. Despite the latest forms of communication, the living word still plays a significant role."
>
> From the Book of Impressions on the Congress about HVAC



Photograph: Unsplash/Ruth D.

It's been said:

Branislav Todorovic says that at the Congresses about HVAC they wished to present themselves to the world, to juxtapose themselves with the competitors and to exchange knowledge and experiences. "We have always invited for the Congresses prominent experts, scientists and researchers from other countries, professors and representatives of the most famous manufacturers. From the very first impression, we knew that our knowledge was at the highest level and that our schools in the field of thermo-technics were side at the top in the world. The credit for all of that goes to many distinguished professors, including Mladen Popovic, Milorad Urosevic, Sava Vujic, Jovan Sel and others."

also maximum result and employee's health protection. These conditions are particularly strict in the industries such as electronics, food, pharmaceutical, film tape roll and tobacco production as well as in other branches.

Large buildings with premises for a great number of people, especially those built in large cities, also required huge amounts of air for the life and work of the users of those facilities, so the need for clean breathing air was another reason for science and industry to focus even more on air conditioning.

Buildings located below the Earth's surface such as parking lots, train stations, shops, various traffic tunnels and underpasses for pedestrian, ask for implementation for ventilation and air conditioning. In addition, space technology which has also perverted into the armaments industry, whose consequences we got the chance to know from close in 1999, has aroused the search for means of defence and protection, so the ventilation was developing in that direction too which comprises underground shelters for people, factories and airports beneath the surface, protection against toxic gases, radioactive radiation and high shock pressures etc.

This development of air conditioning technology with all the problems imposed by the energy crisis, the environmental protection and modern technology, has affected our economy, project designs, ability to construct the most complex and up-to-date air conditioning systems, as well as research topics. Besides, our companies do business not only locally, but they are winning foreign markets.

The level of our economic progress in the HVAC field, as well as of our science, has been recognised internationally. Our experts were invited to participate in similar conventions around the world, on international congresses and to

> "During those three days, I met almost all the colleagues that I have worked with and collaborated hitherto, as with my classmates."
>
> From the Book of Impressions on the Congress HVAC

47

HVAC in numbers

- **50** miscellanies
- **2,252** authors and co-authors
- **1,911** works
- **20,539** pages

So far, 45 printed miscellanies have been published which were written for seminars, i.e. the latter Congresses on HVAC. From the 46th Congress, the miscellanies became digital. In October 2019, the digitization of the miscellanies will be completed and available at www.izdanja.smeits.rs, in compliance with the standards for the publication of scientific and professional works which allows for much greater visibility and citation.

Photographs: KGH

give a lecture at various universities. The Society for HVAC becomes a member of the international organisations, the Congress on HVAC takes place as one of the conventions organised by the International Refrigeration Institute from Paris, and the Clima World Congress 2000 was organised in 1989. Our experts become honorary members of Hungarian, Russian, American and other professional associations.

The influence of Congress on the profession in the country

For our experts, it is undoubtedly important that the graduates, the youngest holders of a degree in engineering who had an outstanding thesis, have given their first lectures at the congresses. They were coming almost straight from the school bench to the booth to present their work, with visible stage fright and excited, but encouraged to pursue a career in this branch of technology. Most of them took part in later congresses too, but on those occasions as experienced engineers, PhDs and professors.

> "The first time we took part was in 2004. The impression was that it was a pity that we have not found it convenient earlier to participate as exhibitors at the Congress."
>
> From the Book of Impressions on the Congress HVAC

It's been said:

Milan Jankovic, President of the Belgrade Chamber of Commerce, at the opening of the 43rd Congress, in December 2012, stated: "You, engineers, are an elite in every society. The state for its part should pay due attention to engineers since without them there is no progress in society, neither research, innovation, nor the final product."

The influence of the Congresses, actually of all that could be heard and that was happening there, reflected in all areas. At the universities, current topics were given for the graduate and master's thesis. The literature was getting richer. There were many cases where local companies seized the opportunity upon arrivals of world experts to consult them on projects or the research they were working on at that moment. On one occasion, a student who was working on his thesis in the field of thermal comforts took the opportunity during the Congress to talk with Prof. Fanger, whose books he was referring to while preparing his graduate papers. Professor Fanger later admitted that he could not defend some of his thesis and that he had to do so in writing, upon his return to Denmark.

Congress – A Place for students to gain practical knowledge

Thanks to the enterprise of Branislav Zivkovic, Ph.D., from the Department of Thermal Engineering at the Faculty of Mechanical Engineering in Belgrade, students had trainings at the Sava Centre. This activity has helped future colleagues to get to know the equipment for HVAC outside the classrooms, which is precisely the thing they lacked. They were not only getting to know the equipment, but also the people, and to feel the atmosphere of socializing and give their career a specific direction. It is how the exhibition and Congress on HVAC benefit complete sense.

A successful program for students

Side by side with the organisation of trainings during the Congress, a special program was designed for undergraduate and postgraduate students of the related faculties in Serbia. In the following years, student programs continued, the masters of science and profession were hanging out with their young colleagues, and the number of students exceeded the number of chairs in Annex B of the Sava Cen-

tre, so many were sitting on the steps. It is common to hear, at the time of the Congress, that "the future of the profession is in Belgrade".

National Student Competition

The national competition is designed for students who defended or applied for their masters and graduate papers at the faculties whose curriculum is within the thematic scope the Congress on HVAC. Students present their papers, which had been prepared according to the guidelines for the authors of the Congress on KGH, before a five-member jury consisting of lecturers in the areas of heating, cooling and air conditioning from the University of the Republic of Serbia.

The winner of the National Competition participates in the student competition of REHVA (European Federation of National Associations for HVAC), and the Society for HVAC of Serbia covers costs of travel, accommodation and registration fees. Thus one of the colleagues, Daniel Todorovic, from the Faculty of Technical Sciences in Novi Sad, won an excellent fourth place in May 2019 in Bucharest.

> We consider the Congress the most important event for manufacturers of HVAC equipment in the country."

From the Book of Impressions on the Congress HVAC

> The Congress about HVAC is a manifestation that our industry needed - primarily due to the excellent opportunities for product presentation and business prospects."

From the Book of Impressions on the Congress HVAC

"Who's Who at HVAC"

To the practical question – how to get the information you need in a multitude of ads and business messages given by our sponsors and co-publishers of the "KGH" Magazine without much wandering - the answer is a guide, or handbook, entitled "Who's Who at HVAC". It provides systematic and useful information about companies' businesses and where certain equipment or supplies can be obtained at our local market for heating, cooling and air conditioning. Editor of this highly valuable book is Zivojin Perisic, MSc MEng.

The guide – in print and digital edition, also bilingually published in complete – contains current information on exhibitors at the Equipment and Achievement Exhibition, which accompanies the Congress, with up-to-date addresses and other information all necessary for establishing business contact.

To help the user of this guide find out as easily as possible where he can obtain a particular service or procure material and equipment required for installation of his heating, cooling or air conditioning system, the spread-

New Program – Specialized Exhibition

Within the 41st International Congress on HVAC, in December 2010, it was organized and set up for the first time a special part of the exhibition dedicated to software, information technology and green programs and networks. The role of Software and Information Technology (IT) in all sectors of specialized engineering and scientific work in the fields of HVAC is indispensable today, so this segment has become an integral part of the Congress and its accompanying exhibition.

sheets have been prepared which indicate the company's name and its advertisement, where detailed information can be found.

A brief history of activities at the International Refrigeration Institute

At the territory of the former Yugoslavia, the cooling technique has a very long tradition, which through the application of refrigeration to industrial purpose dates as far back as the beginning of the 18th century. The Kingdom of

Serbia was leading the way, by having built chains of cold storages. It organised a scientific approach to refrigeration which was dictated by the fact that we have always been an agricultural country and a significant exporter of agricultural products. There was a need to learn and apply the latest advances in refrigeration technology as soon as possible, so in 1908 Serbia initiated the establishment of the International Refrigeration Institute. Interestingly enough, during the celebration of the 50th anniversary of the Institute, it was mentioned that Serbia had founded a national refrigeration committee before of before any country (May 19, 1908) and The Netherlands and France looked up to Serbia in that matter in September 1908 and December 1908, respectively.

The Refrigeration Industry Commission was founded back in 1907, within the Ministry of the National Economy of the Kingdom of Serbia, and Prof. Djoka Stanojevic headed it. Apart from being the first in Yugoslavia to organize the national refrigeration committee, Serbia was an early adopter of natural ice usage. Thus, right after starting a brewery in Pancevo, namely during the winter in 1723 and the subsequent years, ice was used in a brewery warehouse which was cut on the Tamis river, and it was found that in 1820 at coastal part of the territory of the former Yugoslavia ice was brought from the mountains and used for storage of sea fish.

Prof. Djoka Stanojevic published a remarkable book "The cold industry", which was printed in 1909 in Belgrade, whose content encompassed the refrigeration application on food, flowers, silkworms and other products; ice production; facilities and equipment of cold storages; application of cooling in hospitals and in the army; refrigerated transport; refrigeration plants in Serbia and other countries.

At the Second international refrigeration congress, held in Vienna in 1910, Serbia won flattering accolades for excellent achievements in the application of food refrigeration, construction of refrigeration plants and refrigerated transport vehicles and their proper use, and also for the professional promotion of appropriate staff and published work about cooling. This recognition was given in Vienna at the time of the famous Customs War (1906–1911) waged by The Austro-Hungarian Monarchy against Serbia.

Upon the end of World War II, Yugoslavia primarily paid attention to the construction of the basic industry and electrification, that is, it neglected the needs and opportunities for the development of agriculture, the food industry and the construction of cold storage systems and storage of refrigerated food products. The consequences of such a course had a very negative impact on the development of agriculture and other activities, the population structure and the life standard, so the incurred disadvantages are still present.

By continuous efforts of many Yugoslav experts, the Federal Bureau of Economic Planning accepted "Guiding program for the development of agriculture 1952–1962". This program was partially implemented after 1954, thanks to the contribution of the professional association which was founded on June 17th, 1957 in Belgrade as Professional association of refrigeration techniques in Yugoslavia. Soon, the Business Association of the Refrigeration Network in Yugoslavia was established in Belgrade by the name "Jugofrigo".

It's been said:

„There is no such convention in Europe with that long tradition of stable growth and regular assemblage." That was said by Gameiro da Silva, Ph.D., the vice president of REHVA, in his welcome speech, at the beginning of the 46th International congress and exhibition on HVAC.

Forum and UNEP booth at the 42nd Congress on HVAC

Forum at the 42nd Congress on HVAC, held in December 2011, was jointly organized by the Ministry of Environment, Mining and Spatial Planning of the Republic of Serbia, Society for HVAC and UNEP OzonAction to divert attention to the necessity of applying modern technologies in cooling that does not damage the environmental health.

The forum and the exhibition booth were organized to overcome obstacles to the implementation of the ozone layer and climate-friendly technologies and to promote phasing out the hydrochlorofluorocarbons (HCFCs) as the Montreal Protocol stipulated it. These substances contribute to the depletion of the ozone layer and global warming.

Prepared by: Tamara Zjacic

50. MEĐUNARODNI KONGRES I IZLOŽBA O KGH

50th INTERNATIONAL HVAC&R CONGRESS AND EXHIBITION

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Sava Center, Belgrade
December 4–6, 2019

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AUSTRALIA CLEARED 7.7M HECTARES OF THREATENED SPECIES HABITAT SINCE INTRODUCTION OF ENVIRONMENT ACT

More than 7.7m hectares of habitat have been cleared since the introduction of Australia's national environment act, according to new research that finds 93% of land cleared was not referred to the federal government for assessment.

The study, led by researchers from the University of Queensland and three environment organisations – the Australian Conservation Foundation, WWF Australia and the Wilderness Society – warns that Australia's high extinction rate will increase "without a fundamental change" in how environment laws are enforced.

The scientists used publicly available spatial data to quantify the amount of clearing of potential habitat for 1,638 listed threatened species and ecological communities – which are groups of species that form a single habitat – between 2000 and 2017.

They used the federal government referral record to calculate how much of the clearing had been referred to the government for assessment.

The study examined two types of habitat – forests and woodlands – and excluded clearing that had occurred before the Environment Protection and Biodiversity Conservation (EPBC) Act came into force in 2000 and any clearing that was due to natural causes such as fire.

They calculated that the land cleared included 7.7m hectares of potential habitat for terrestrial threatened species, 64,000 hectares of habitat for terrestrial migratory species, and 330,000 hectares for threatened ecological communities.

The researchers found that clearing had affected potential habitat for 84% (or 1,390) of the species studied and that the overwhelming majority of that clearing (93%) had not been referred to the federal government for scrutiny under the EPBC Act.

"This noncompliance means that potential habitat for terrestrial threatened species, terrestrial migratory species and threatened ecological communities have been lost without assessment, regulation or enforcement under the EPBC Act," they wrote.

Some species suffered more habitat loss than others. According to the study, the Mount Cooper striped skink lost 25% of its potential habitat, the Keighery's macarthuria, a plant native to Western Australia, lost 23% and the southern black-throated finch lost 10%.

The researchers found that 1.1m hectares of potential habitat for koalas had been cleared.

"These are the species threatened with extinction," said Michelle Ward, the study's lead author from the University of Queensland. "If we don't stop their habitat loss, they're going to go extinct."

Queensland was the location of the highest levels of clearing – the state had nine of the 10 species that lost the most potential habitat.

A statutory review of the EPBC Act is due to begin this year. Ward said the researchers would be submitting comments based on their research.

Their paper says Australia's national environment laws have been "ineffective" at preventing habitat loss and calls for amendments that require critical habitat, where possible, to be mapped and monitored for threatened species and ecological communities, and for protection of that habitat to be enforced.

"We think that the act should be amended so that critical habitat is mapped, available to stakeholders and fully protected from further destruction," Ward said.

Source: Guardian

Photograph: Unsplash/Philippe Wuyts

FOOD PRICE INDEX HOLDS STEADY

The FAO Food Price Index, which tracks monthly changes in the international prices of commonly-traded food commodities, averaged 170 points in September, virtually unchanged from August and 3.3 percent higher than in the same month in 2018.

The FAO Cereal Price Index held steady on the month, as wheat prices rose while those of maize declined. International rice prices fell modestly amid slow import demand and uncertainties surrounding policies in the Philippines and Nigeria.

The FAO Vegetable Oil Price Index rose 1.4 percent in September to its highest level in more than a year. The increase was driven by steady demand from India and China for palm oil imports and higher price quotations for rapeseed oil, linked to firm demand from the European Union's biodiesel sector. Soy and sunflower oil prices both dropped.

The FAO Sugar Price Index declined 3.9 percent from August, driven by the expectations of ample stocks and supply trends as well as reduced demand in Brazil for sugarcane to use in the production of ethanol.

The FAO Dairy Price Index declined 0.6 percent, as higher quotations for milk powders were more than offset by falling cheese and butter prices, especially at the lower end of the price range.

The FAO Meat Price Index rose 0.8 percent, driven by solid import demand from China. While pigmeat prices in China, the world's largest market, remained at the high levels recorded in August, increased export supplies in Europe prodded pigmeat prices in international markets lower.

In the new Cereal Supply and Demand Brief also published today, FAO slightly lowered its forecast for global cereal production in 2019 to 2 706 million tonnes, which would amount to 2.0 percent higher than in 2018.

The reduction reflected a cut to Australia's wheat harvest due to dry weather and trimmed projections for rice output in China, India, the Philippines and the United States of America.

Meanwhile, FAO raised its estimates for worldwide coarse grains production based on an improved outlook for barley production and better maize prospects in Brazil and the U.S.

World cereal utilization in the year ahead is now forecast at 2 714 million tonnes, slightly trimmed from last month's estimates but still a record high. World cereal stocks are now expected to amount to 850 million tonnes by the close of the 2020 seasons, down 2.0 percent from their opening levels. Global wheat inventories are anticipated to expand by 1.6 percent, while those of maize will likely register a significant decline, mostly due to expected sharp drawdowns in China.

FAO left its forecast for world trade in cereals in 2019/20 unchanged at around 415 million tonnes. World wheat and rice exports are set to rebound, while those of coarse grains are expected to decline.

Source: FAO

Photograph: Pixabay/Pexels

MORE THAN HALF OF NATIVE EUROPEAN TREES FACE EXTINCTION, WARNS STUDY

More than half of Europe's endemic trees are threatened with extinction as invasive diseases, pests, pollution and urban development take a growing toll on the landscape, according to a study.

Ash, elm and rowan trees are among those in decline, says the assessment of the continent's biodiversity, which could complicate efforts to tackle the climate crisis through reforestation.

"It is a threat. It is not just the naturally occurring trees and woodlands, it is also some of the big commercial conifers that are threatened by invasive species," said one of the authors of the report, David Allen of the International Union for Conservation of Nature, who produced the study.

He warned that countries such as the UK were keen to import more saplings to draw carbon out of the atmosphere, but said young trees needed to be carefully screened to avoid diseases and pests entering the country and depleting existing forests.

"We are encouraged to plant more trees, quite rightly, but we have to be very careful to ensure they don't come with pest species. We need to be very careful about biosecurity," he said.

Photograph: Vesna Mijailovic

Invasive species – spread through the trade of plants or untreated timber – are the largest threat to native trees that are found only in Europe, sometimes only in one valley or region.

The IUCN's European red list of trees found 58% of these endemic trees are threatened and 15% (66 species) were classified as critically endangered.

Many of those at greatest risk are in the Sorbus genus. This includes rowan, mountain ash and Ley's whitebeam, of which there are only nine plants left – all in Merthyr Tydfil, Wales. Scientists say this particular tree is a relatively recent hybrid and there was only ever a very small population in a restricted geographical area, so the knock-on effects are likely to be minuscule.

Of greater concern is the demise of more common trees. Tim Rich, another of the contributors to the study, said he was alarmed by the loss of ash trees due to an invasive fungus.

"I've been keeping an eye on it over the past five years. Last year, I began to get quite worried. This year, huge areas are experiencing a dieback and it's not just affecting saplings like it was before. Now it's whole big trees. I drove in some parts of Pembrokeshire recently, and every five or 10 metres there was an ash tree dead or dying. This is a major problem – way worse than I expected it to be."

Source: Guardian

UNPRECEDENTED MOMENTUM FOR GREEN HYDROGEN

Hydrogen from renewable energy could play a central role in the global energy transformation, the latest report by the International Renewable Energy Agency (IRENA) finds. 'Hydrogen: a renewable energy perspective' estimates that hydrogen from renewable power, so called green hydrogen, could translate into 8 per cent of global energy consumption by 2050. 16 per cent of all generated electricity would be used to produce hydrogen by then. Green hydrogen could particularly offer ways to decarbonise a range of sectors where it is proving difficult to meaningfully reduce CO_2 emissions.

Decarbonisation impacts depends on how hydrogen is produced. Current and future sourcing options can be divided into grey (fossil fuel-based), blue (fossil fuel-based production with carbon capture, utilisation and storage) and green (renewables-based) hydrogen. Blue and green hydrogen can play a role in the transition and synergies exist.

With falling cost of renewables, the potential of green hydrogen particularly for so called 'hard-to-decarbonise' sectors and energy-intensive industries like iron and steel, chemicals, shipping, trucks and aviation is rapidly becoming more compelling given the urgency to limit CO_2 emissions. This includes direct hydrogen use but also the production of liquid and gaseous fuels such as ammonia, methanol and synthetic jet fuel from green hydrogen. Electrolyzer deployment is currently ramping up from MW to GW-scale as witnessed by dozens of projects worldwide.

Large-scale adoption of hydrogen could also fuel an increase in demand for renewable power generation, IRENA's report finds. In total, IRENA sees a global economic potential for 19 exajoule (EJ) of hydrogen from renewable electricity in total final energy consumption by 2050. This translates into around 4-16 terawatts (TW) of solar and wind generation capacity to be deployed to produce renewable hydrogen and hydrogen-based products in 2050.

However, deployment of hydrogen-based solutions will not happen overnight, IRENA's report cautions. Hydrogen might likely trail other strategies such as electrification of end-use sectors, and its use will target specific applications. The need for a dedicated new supply infrastructure may also limit hydrogen use to certain countries that decide to follow this strategy. Existing natural gas pipelines could be refurbished, but implications must be further explored.

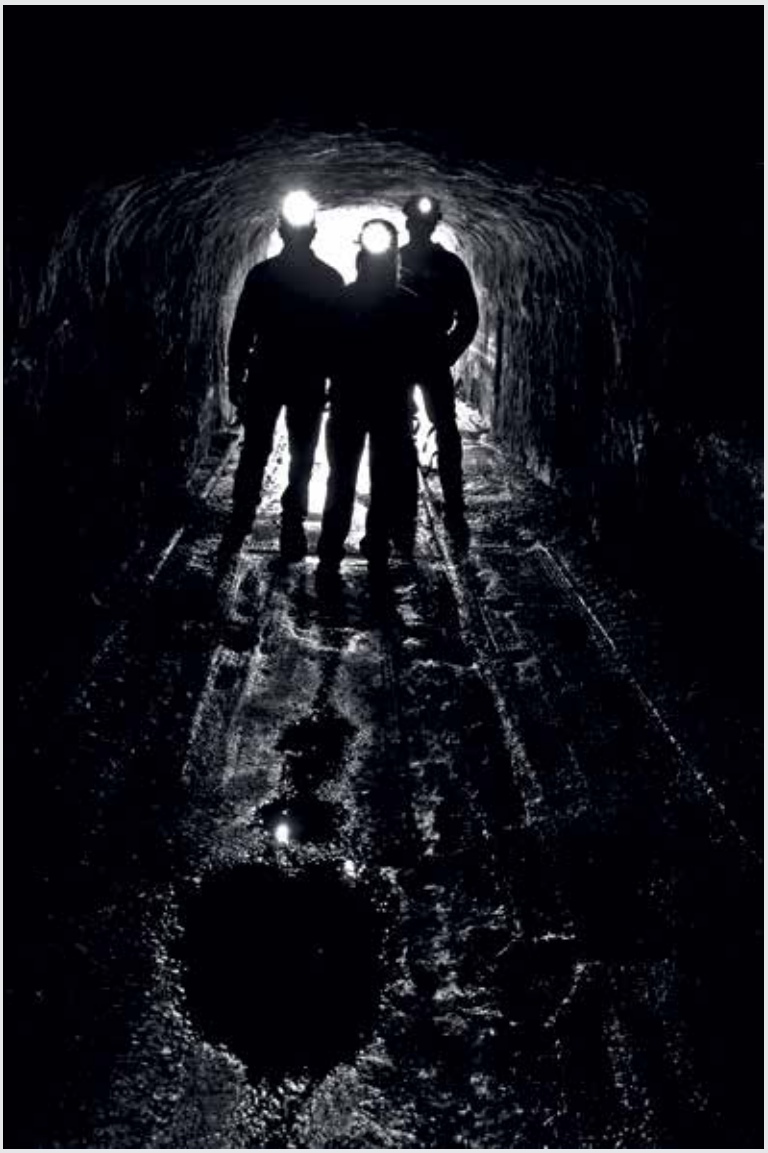
Green hydrogen could make a substantial contribution to the energy transition in the long run. The report recommends acknowledging the strategic role of hydrogen in the transition and at the same time calls on governments and private sector to better understand energy system benefits, cost-reduction and investment requirements to tap into the potential of a hydrogen future.

Download IRENA's report 'Hydrogen: a renewable energy perspective'.

Source: IRENA

Photograph: Irena

41 EUROPEAN MAYORS DECLARE SUPPORT FOR A JUST TRANSITION FROM COAL



A group of 41 mayors from 10 coal regions in 9 European countries are launching a statement supporting a just transition to the post-coal era. Two of the mayors - from the Czech Republic and Germany - presented this statement to the EU Commission's Deputy Director-General for Energy, Klaus-Dieter Borchardt at the meeting of the EU "Coal Regions in Transition Platform" in Brussels on 16 October. The Platform aims to help regions overcome their dependence on coal by developing sustainable economic activities.

In the declaration they:

- 1 affirm their commitment to the Forum of Mayors on Just Transition;
- encourage governments to engage in dialogue with regional stakeholders;
- underline the importance of transparency and consultation with local governments in the European Commission's' "Coal Regions in Transition Platform" initiative;
- urge that appropriate mechanisms are made available at the national and European levels for capacity building and to ensure financial support for the just transition;
- welcome the proposal of the European Union institutions for a Just Transition Fund, under the condition that it will be adequately funded and used for the support of local communities and the development of sustainable economic activities creation in coal and lignite mining regions;
- call on the European Council, the European Parliament, the European Commission and the Energy Community to strengthen their support for just transition; and
- commit to continued action, at the local level on just transition and to supporting each other in creating a sustainable future for the benefit of all our citizens.

The signatory mayors come from Germany, Slovakia, Poland, Romania, Greece, Bulgaria and the Czech Republic. Two are from non-EU countries (Bosnia and Herzegovina and Montenegro) where phasing out coal is not yet even being discussed, showing that in some cases, regions are taking the lead.

"41 mayors have signed the Declaration and we hope to get more signatures. We know change is happening but we now need help from the EU to build our capacity at regional level to cope with the change and to help us access the necessary resources to support a fair and successful transition for all our communities", said Kamila Bláhová, Mayor of Litvinov (Czech Republic).

One of the signatories is the mayor of Bob dol in Bulgaria. WWF-Bulgaria has been working with stakeholders in the Bob dol and Pernik Municipalities for the past year. A study of the Southwest coal region in Bulgaria was conducted which provided 3 scenarios for possible coal-free prosperity for the region.

Source: WWF

Photographs: Pixabay

WHO CALLS FOR MORE RESEARCH INTO MICROPLASTICS AND A CRACKDOWN ON PLASTIC POLLUTION

The World Health Organization (WHO) today calls for a further assessment of microplastics in the environment and their potential impacts on human health, following the release of an analysis of current research related to microplastics in drinking-water. The Organization also calls for a reduction in plastic pollution to benefit the environment and reduce human exposure.

"We urgently need to know more about the health impact of microplastics because they are everywhere – including in our drinking-water," says Dr Maria Neira, Director, Department of Public Health, Environment and Social Determinants of Health, at WHO. "Based on the limited information we have, microplastics in drinking water don't appear to pose a health risk at current levels. But we need to find out more. We also need to stop the rise in plastic pollution worldwide."

According to the analysis, which summarizes the latest knowledge on microplastics in drinking-water, microplastics larger than 150 micrometres are not likely to be absorbed in the human body and uptake of smaller particles is expected to be limited. Absorption and distribution of very small microplastic particles including in the nano size range may, however, be higher, although the data is extremely limited.

Further research is needed to obtain a more accurate assessment of exposure to microplastics and their potential impacts on human health. These include developing standard methods for measuring microplastic particles in water; more studies on the sources and occurrence of microplastics in fresh water; and the efficacy of different treatment processes.

WHO recommends drinking-water suppliers and regulators prioritize removing microbial pathogens and chemicals that are known risks to human health, such as those causing deadly diarrhoeal diseases. This has a double advantage: wastewater and drinking-water treatment systems that treat faecal content and chemicals are also effective in removing microplastics.

Wastewater treatment can remove more than 90% of microplastics from wastewater, with the highest removal coming from tertiary treatment such as filtration. Conventional drinking-water treatment can remove particles smaller than a micrometre. A significant proportion of the global population currently does not benefit from adequate water and sewage treatment. By addressing the problem of human exposure to faecally contaminated water, communities can simultaneously address the concern related to microplastics.

Source: WHO

Photograph: Petar Zambo

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WAITING FOR A GOOD WIND TO COME

CEEFOR ENERGY EFFICIENT SOLUTION provides proper technical support to investors and banks, as well as technical support for setting up and placement of earmarked credit lines for energy efficiency and renewable energy sources. The company is focused on the reduction of energy consumption through the implementation of energy efficiency measures which have the effect of reducing costs and negative impact of the harmful components that cause the greenhouse effect. **CEEFOR ENERGY EFFICIENT SOLUTION** develops projects in the field of renewable sources, solar, hydro, geothermal, wind energy and biomass, as well as the projects for biogas plants, cogeneration and gas power plants. They also work on projects in electromobility, using fast and ultra-fast chargers for electric vehicles.

Photograph: Timon Tamas

Centre for energy efficiency and sustainable development - **CEEFOR ENERGY EFFICIENT SOLUTION** as the company devoted to the development of projects, implementation of energy efficiency measures and renewable energy sources in the Balkans, became a partner to Elektroprivreda Srbija (EPS) in construction of the "Kostolac" wind farm. In the plain Stig, in Eastern Serbia, there are thermal power plants and coal mines, so fossil fuels in this region will get a "clean" alternative in the form of wind turbine towers. A project to build a 66 MW wind farm is underway in Kostolac. The idea is that the plant supplies about 30 thousand homes with electricity. The leading investor Elektroprivreda Srbije invests 15 billion euros from their resources. The project is divided into two tenders. The first one is focused on wind turbines, foundations and electrical works and the other project is all about construction works, internal roads, connections to state roads and their design and construction. The "Kostolac" wind farm consists of 20 wind turbine towers arranged in 4 unities: Drmno, Petka, Cirikovac and Klenovnik. The plan includes the construction of a transformer station 35/110 kV and an administrative building. There are two parts of the transformer station, one for the power plant and the other for the connection of the power plant.

The wind is not the only renewable source in the plan of Elektroprivreda Srbije – it is also planned to build a solar power plant with the installed capacity of 9.9 MW in Petka. The Ministry of Construction, Transport and Infrastructure issued the building permit for the wind farm in February 2019. The wind farm "Kostolac" connects to the electricity transmission system which belongs to "Elektromreza Srbije". The contract for designing the wind farm was signed between the investor Elektroprivreda Srbije in October 2017 in cooperation with the consortium leader **CEEFOR ENERGY EFFICIENT SOLUTION**, Masinoprojekt Kopring, The Faculty of Civil Engineering University of Belgrade, School of Electrical Engineering University of Belgrade, IMP-Automatik, Geomehanika, KFG, NDC. The wind farm "Kostolac" is one of the projects of national importance. Of course, the primary objective is to reduce environmental pollution, since the use of coal will significantly be reduced, and the use of clean wind energy will be increased. This project will also contribute to the involvement of local businesses. Consequently, this will lead to an increase in employment and the development of the economy of the city and the surrounding.

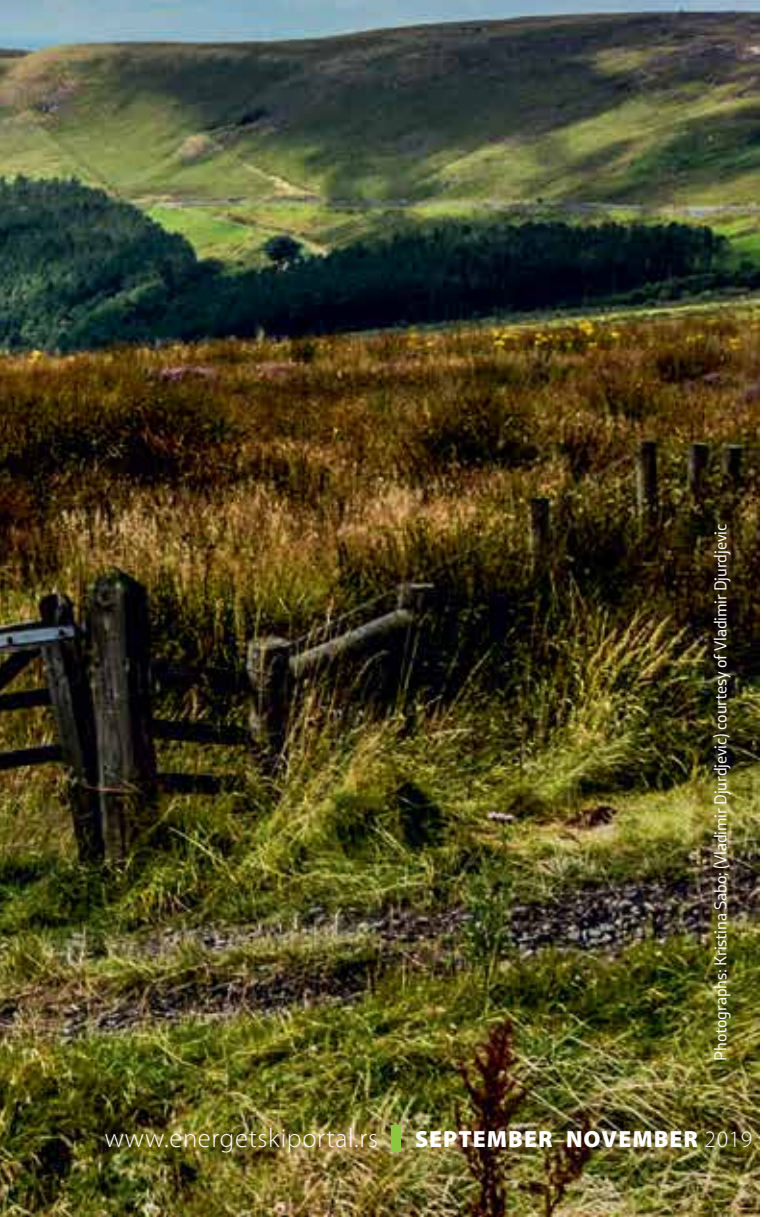
The wind farm "Kostolac" is one of the **projects of national importance**

The idea is that the plant supplies about **30 thousand homes with electricity**

CLIMATE PROCRASTINATION

It is evident that climate change is becoming a topic of high interest year after year, which attracts the attention of many, from the general public, through professional associations, civil society organisations and NGO's and the economy, to the highest levels of government bodies. Our country is not the only case, a similar trend exists around the world

VLADIMIR DJURDJEVIC
Meteorologist and Assistant Professor at the Institute of Meteorology, Faculty of Physics, the University of Belgrade, known to the expert and general public as the leading Serbian expert for climate change. In addition to scientific researches and publications in the most prestigious scientific journals, Djurdjevic is known for his active involvement in raising public awareness of the dangers of climate change. He is the recipient of the World Meteorological Organization's award for the best published work in the field of meteorology in Serbia for 2010, as well as the Annual Award of the Faculty of Physics for the Scientific work for 2017. His research areas include climate change, numerical climate modelling, numerical modelling of geophysical processes, regionalisation of climate projections, the impact of climate change on socio-economic sectors and the living world and the adaptation to climate change.



Photographs: Kristina Sabo, Vladimir Djurdjevic] courtesy of Vladimir Djurdjevic

Although it was evident at the beginning of the second half of the last century that significant changes in the climate system could be expected and that these changes would have an adverse impact on society and the living world, it seems that these predictions about possible problems in the future, especially because we refer to distant future at the moment, were not enough to trigger the wider interest that exists today. It may sound a little improbable yet in addition to the fact that the scientists, who were constantly warning about the changes we are witnessing today, informally predicted when these changes would attract the attention of the wider public, as well as the interest that would extend beyond the relatively small research community of that time.

Fifty years ago, the signal of change was not big enough to be discerned from variations that were the part of natural processes without detailed analysis. At that point, estimates suggested that the signal of climate change would fall outside the range of natural variability in the late 1990s and early 2000s, and also that the frequency and intensity of individual anomalies would be large enough to indicate unequivocally that we were entering a new age when we talk about the climate of our planet. It happened at the turn of the century, the value of the mean temperature of our planet came out of the range of natural fluctuation, while extreme weather and climatic events were more often described as something that hadn't been seen before. Today, the mean global temperature of the planet is 1 °C higher than the mean value from the period before the Industrial Revolution, and it ultimately falls out of the range of variability of its value over the last 10,000 years, the period is known in science as the Holocene Epoch during which the modern civilisation emerged.

In addition to the fact that the data clearly show that the climate of our planet today has changed in many aspects, it is very important to know what is causing these changes. The explosive development of society from the beginning of the Industrial Revolution to nowadays, as well as the level of comfort in which modern society enjoys, are correlated at the large extent with the consumption of large amounts of energy that has become easily available to us by using use of fossil fuels. Coal, oil and gas are the main energy support for a wide range of activities, from the simple daily needs of each of us to the very complex and energy-intensive industrial processes. However, the massive use of fossil fuels also entails unfavourable consequences, namely the emission of greenhouse gases, primarily carbon dioxide. From the beginning of the Industrial Revolution, the concentration of this gas in the atmosphere has

increased by 45 per cent, making our planet absorb more energy than it emits into space. Quite simply, the uncontrolled emissions put the planet in an energy imbalance which caused its warm-up.

The gradual warming of the planet caused many other changes. Some of the changes are melting of the poles, Greenland and glaciers around the world, the rise in global ocean levels, the increased frequency and intensity of heatwaves, changes in the circulation of air masses due to which the situation with abrupt penetrations and quasi-stationary systems became more common. Also, since warmer air may contain more water vapour, namely with the temperature rise of one-degree water vapour increases by 7 per cent, nowadays in the atmosphere, which is rich in water vapour anyway, when the clouds are forming, we can expect heavy rainfalls. Rainfall intensified in almost all parts of the world, particularly in those located in the extreme parts of allotment, which led to an increased risk of flooding.

Since the intense rainfall is the most common element of storm clouds, situations with stormy weather have also become more frequent and the "power" of storms more devasting. On the other hand, due to the high temperatures that enable faster evaporation of water from the soil, droughts have also become more frequent and intense, especially in the areas which have already been arid and semiarid. In situations in which forest fires occur, frequent droughts, accompanied by high temperatures and heatwaves, enable the faster spread of forest fires thus covering larger areas more quickly. Therefore, it is not surprising that in recent years, we have had examples of forest fires around the world that spread over unusually large areas and even in the regions such as Scandinavia and Siberia.

All this had an impact on the living world; thus, many changes have been recorded in it, and this year the first results of a comprehensive analysis have been published, indicating that we are probably on the verge of the next great extinction. What particularly worries, except the fact that these changes are becoming more evident year after year, is their pace, which is becoming faster, due to the increasing greenhouse gas emissions, which, with few exceptions, continue to grow every year and the existence of positive feedback in the climate system also accelerates this process. If the whole process continues in this direction and this pace, some of the feedbacks in the future can lead to dramatic changes in the relatively short term. The sudden release of methane from the permafrost of the northern latitudes would give additional impetus to global warming, while the accelerated melting of western Antarctic ice sheet or Greenland would lead to an increase of the global ocean by an additional few meters above the estimates that are currently considered to be most likely.

Apart from the fact that we are aware of the magnitude of climate change today, as well as of the reasons that have caused it, it is even more important that we can evaluate what it will be like in the future and that depends on our actions. If the fossil fuels remain the primary source of

energy and emissions continue to rise from year to year, the planet will warm up by additional 4 to 5 °C by the end of the century. In that case, we can talk about the planet that is not recognisable in many elements. The greatest danger to society is the fact that frequent losses, as a consequence of extreme weather and climate conditions, as well as possible migrations, due to the rising level of the global ocean, can lead to the temporary stagnation of global society. Namely, the annual damage caused by climate change may be than the usual growth which society expects, thus instead of developing the society in the direction of improving the quality of life, all resources would be directed to constant damage coverage and reconstruction of the lost.

To avoid such an unfavourable scenario, in 2015 all countries of the world agreed, by signing Paris Agreement, that this problem must remain within acceptable limits, and

Photographs: (top left) Nenad Stojanović; (middle right) Vladan Milanović

that it was necessary to limit the temperature rise to 2 °C. Most studies and analyses indicate that this limit is generally acceptable. As for an additional one degree of increase in temperature compared to the current change, society still has a chance to adapt to changes without compromising its further development. For this to be fulfilled, fossil fuels need to be abandoned during the first decades of the second half of the century, and the energy coming from the renewable sources such as sun, wind and water needs to be the carrier of the humanity's energy needs.

Throughout the world, this transformation has already been initiated. Year by year the data show that the speed at which new renewable power plants, especially those producing energy from the sun and wind, are put into operation, exceeds the estimates of their development published only a few years ago. Naturally, this revolution is happening faster than expected. With the introduction of electric vehicles, the automotive industry seems to be going through a renaissance period, which was also aided by the

Photographs: (bottom left) Sinisa Ljubisavljevic; (top right) Bosko Bunusevac

unexpected fall in battery prices. It is indeed encouraging news, but for the Paris Agreement to be fulfilled, all this must be several times faster than the current trends. This fact has been recognised by many countries, especially the European Union member states; thus decarbonisation deadlines are becoming more ambitious, although the public demand for necessary changes is certainly contributing to this, including the loud and clear demands of teenagers in recent months. Abandoning fossil fuels is an unavoidable task when it comes to fulfilling of the Paris Agreement, but adapting to climate change must not be left aside. Today, adjustment is already required in many areas compared to the current changes, and even if the Agreement turns out to be successful, the planet will go through another warming period in the next few decades, thus as the time passes by, the adaptation will only gain in importance. In this respect, all relevant sectors need to recognise this, and they need to adapt their development plans to the fact that climate will undoubtedly be different in the future.

In addition to broad interest, what is missing now is widespread action, which is necessary if we do not want to jeopardise our future, as well as the future of the following generations. We need to be aware that the excuse a lack of action no longer exists since when it comes to climate, all cards are put on the table.

Vladimir Djurdjevic

TOWARD NEW TECHNOLOGIES AND INVESTMENTS

In one district in southeast Serbia, entrenched opinion about our short-term memory and disregard for the environment go up in smoke. There, people do care about the environment in which future generations will live. For our interlocutors, the new generations are not only the kids playing in local parks these days, and the future is not a timeline that encompasses only the next few years. Here, the plans are being made for the next 40 years

During the bygone summer, the team of Energy Portal visited the city of Pirot, the administrative centre of the district after which it got the name. Pirot district, which also includes municipalities of Babusnica, Bela Palanka and Dimirtovgrad, is mainly associated with sheep cheese, sour milk and the famous rug. However, our job has brought us to the gates of the public utility company that takes care of the most contemporary regional sanitary landfill in our country. It has been built in accordance with all standards stipulated by our law and regulations for the management of non-hazardous waste, as well as the European Union directive on the disposal of non-hazardous waste.

The landfill is managed by the Public Utility Company "Regional landfill Pirot". The Executive Manager of this company, Nebojsa Ivanov, told us that the site where the landfill is located is old and ideal because, according to experts, it has no negative impact on the environment. It is relatively close to the city. "We are about 5.5 km away from the city centre air distance, and we are also at an adequate distance for performing this activity from other municipalities od Pirot district, which we are in charge of. Besides, it is important to emphasise that property-legal relations have been resolved, since the city of Pirot is the owner of the land on which the landfill is located, without any libilities", says Executive Manager Ivanov, providing us with brief information on the construction of the landfill. "The infrastructure facilities, such as treatment of processed water, an administrative building and scale with accompanying elements, as well as the first landfill cell, we were constructing from 2008 to 2010, and on the first day of 2013, we received the initial amount of waste. The first phase of construction cost 5.31 million euros. The European Union provided 3.81 million euros for works and technical support,

Photograph: Aleksandar Ciric

"The Regional landfill" has the lowest cost of waste disposal at the territory of Serbia, says the executive manager. There is always room for savings, so they plan to cut costs by installing a solar power plant , and they have already installed the pellet boiler room

and a former Eco-Fund of Serbia participated with one million euros, while half a million euros came from the budget funds of the local self-government of the city of Pirot.

The landfill covers the area of 19 hectares, and the second phase should include the planned rehabilitation of the first cell and the construction of the second cell. The third cell will be constructed in the third and the fourth phase. The capacity of one cell is around 30,000 tons per year, which, according to the Executive Manager Ivanov, should be sufficient for waste disposal for 10 to 12 years. The existing landfill should cover the waste disposal needs of this district in the future, that is, in the next 30 to 40 years.

During the last year and a half, they have invested a lot in the monitoring system for the possible negative impact of the regional landfill on human health and the environment. Ivanov proudly points out that they developed an isometric network last year. "The fact that you can monitor the quality of groundwater online at any time is a unique case in our country. So far, there has not been any negative impact on groundwater quality, and benchmark companies do an independent analysis on a quarterly basis, based on which a report is developed. We are obliged to submit it every three months to the Environmental Protection Agency. Of course, the purpose of this online groundwater quality monitoring system is to be able to respond quickly in case any change occurs, such as leakage, and well before any negative environmental impact is created."

To perform the process water balance, they have reconstructed a system for the treatment of process water, which is automatically monitored. They have also received well-marked reports from accredited reference laboratories on soil, water and air quality.

With financial assistance of the Slovak government, they installed a state-of-the-art weather station which

measures precipitation, evaporation and other parameters every second and the next step is adding the part for measuring the level of pollution. The citizens of Pirot will have real-time information on the quality of air and the concentration of PM 2.5 and PM 10 particles.

Incentives for waste separation in households

Ivanov says that Vladan Vasic, the mayor of Pirot, has repeatedly pointed out that they should be satisfied because, compared to other cities in Serbia, only Pirot has a regional sanitary landfill. However, he believes that, although the results are good, they are still far away from the standard set by the European Union in terms of waste management.

"So far, 100 per cent of non-hazardous municipal waste is disposed to the landfill. The directive mandates a reduction in the amount of waste that is being disposed of and the increase in selecting and recycling in the range of 20 to 50 per cent. Over the past two years, we undertook certain steps in this area, and they were fruitful. We will be one of four districts in Serbia (besides us, there are Pancevo, Uzice and Sremska Mitrovica) that will start doing the primary separation and selection of municipal waste. That means that each household will get two bins, and a separate transportation line will be introduced for wet and dry waste."

The value of the primary separation project for Pirot District is 1.436 million euros, and the European Union provided the funds through IPA Fund, the Swedish Government and the Ministry of Environmental Protection. According to the executive manager, public procurement is now awaited. "The city of Pirot and the surrounding municipalities are ready. Although we currently do not have any containers for primary separation, I hope that the implementation of this project will start by the end of this year. We are also planning a campaign which will educate and motivate the population, but first and foremost, we need to create the conditions for the primary separation." He stresses out that it is important to stimulate the citizens to separate as much waste as possible. They have a clear idea how to implement this. If each bin is chipped, with the data of a user, provided that the amount of waste is recorded during the load, then it will be known how much waste is being loaded and which street and building collect the most waste in the containers for primary selection. Ivanov says that this is not a big investment. In the next phase, they may introduce, once they have chipped bins and a bin reader, the reduction of the bills for the households that collect the most waste. It would introduce a levy on the amount of attached waste.

The introduction of primary waste separation imposes the need for a secondary separation line. This year, the employees in the public utility company "Regional landfill of Pirot" have prepared project documentation and received the permit for carrying out of works for the introduction of

secondary separation line. It includes the construction of 1,240 m² hall with canopies for bailing of a special type of waste and after that the construction of the access road and other facilities. The estimated value of this project is 1.8 million euros, and they have received funds for the construction of the hall and the arrangement of the plateau, which represents the first phase of the project. They hope that during this year, with the support of the Ministry of Environmental Protection, the additional funds in the amount of 63 million euros will be provided for the competition of construction works of this project, and also that next year, they will have additional 100 million euros for the installation of the equipment and the procurement of machinery.

"In order to meet the future needs of our residents, we have started the construction of the second cell. We have already invested 200,000 euros from our funds. To complete the construction of this cell we need to invest 2 million euros which we need to provide in the following period", says Ivanov adding that they have recently received the funds on competition of the Ministry of Environmental Protection, announced in June, which followed the public call for project documentation. On that occasion, they were awarded 4 million for the construction of a composting plant. By the end of this year, they will develop a preliminary design and prepare documentation for the building permit and construction works execution. The construction of a composting plant is a logical sequence of steps that follows the introduction of primary and secondary separation since 40 per cent of the received waste material is a biodegradable waste. Once processed, this waste can be sold as a quality fertiliser. It also reduces waste disposal to a landfill by another 10 to 15 per cent. According to the plan, they should reach that percentage and also to generate revenue and benefit from the fact that they are not disposing the waste at the existing cell in the first phase.

Photographs: (top) Aleksandar Ciric; (middle right) Company "Regional landfill of Pirot"

They have their work cut out for them in the following years

On the territory of the city of Pirot, in the heart of the industrial zone, by the river Nisava, there is an old dump, which is 2 kilometres away from the sanitary landfill. The PUC "Regional landfill" was given funds from the Ministry of Environmental Protection for the preparation of project-technical documentation for the rehabilitation, closure and cultivation of this non-sanitary landfill, that covers 5 hectares. Their next step will be to prepare a project for cleaning up of all illegal dumps. Although there are no new non-sanitary landfills in Pirot District, which is a mitigating factor, they need to complete the mapping of historic landfills. It involves determining the location, size and cadastral parcel on which the dumps are located, as well as deciding which measures will be taken to prevent the disposal of garbage at these sites.

Of all the projects, Ivanov singled out the preparation of the Regional Waste Management Plan in Pirot District. This implementation is planned for the coming year. Of course, that is not all. In the following period, they envisaged the embedding of the processed water purifier and its digitalisation to be able to monitor the quality of processed waters and to control specific parameters at every second. The installation of flowmeters should also be mentioned, and they also plan to do the balance of processed water.

This vision of the company, which Ivanov heads, is accompanied by a few more important tasks. Next year they should introduce a line for automatic truck washing, to which they are obliged by the Waste Disposal Regulation. Currently, none of the landfills in Serbia has this line. The plan is also to solve the problem of inert waste disposal. This refers to construction waste, which is rapidly being accumulated as Pirot is developing very intensively. "The Regional landfill" has the lowest cost of waste disposal at the territory of Serbia, says the executive manager, and there is always room for savings, so they plan to cut costs by installing a solar power plant, and they have already installed the pellet boiler room. Ivanov says they are planning to develop a project for the collection of landfill gas and the decision whether they will burn it or use it to produce energy, they will bring next year after the development of feasibility study.

"Our ambitious, but realistic, plan also implies the establishment of Centre for education on non-hazardous waste management within our company, and it would be a place in which we would expand our knowledge in this area and tailor its application adapted to our circumstances. We are moving towards new technologies and investments, and new jobs will be created. These are quite certain plans and their implementation will take place over the next 2 to 4 years." Ivanov points out that everything they do is primarily aimed at raising health in this district. When they complete the waste management treatment plant, he says, Pirot will become a real eco-friendly city.

Prepared by: Tamara Zjacic

PRESENTING

ONE DEGREE SERBIA

AGAINST +2 °C

The Balkans and the Mediterranean are the regions that will be most affected by climate change. Although Serbia has the potential to deal with this problem, primarily because of the vast resources of renewable energy, it takes a lot of strength and activity to guide the whole society towards this goal. And the organization One Degree Serbia has been dealing with it for already six years now

People in Serbia know little about climate change and its consequences, much less about possible solutions. Most people think that it is a problem someone else should be dealing with and not ourselves. However, in 2012, Serbia was hit by an unprecedented drought which caused damage to agriculture measured in billions. The following year, Serbia had the highest number of cases of West Nile virus. Both of these phenomena can be linked to climate change. The logical step was establishing the association that will invite citizens to climate action, and so in 2013, the non-profit, non-governmental organization One Degree Serbia was created.

"For the organization's name, we have used the goal that prominent scientists, such as climatologist James Hansen and activists collaborating at the 350.org website believe we must set if we want to preserve biodiversity on the planet and the lifestyle we have now. Global warming must stop at +1 ° C in regard to the temperature before the Industrial Revolution. Unfortunately, the world is already very close to that limit. The limit promoted by politicians (+ 2°C) means that we, as humanity, consciously accept the

Photograph: Milan Stulic

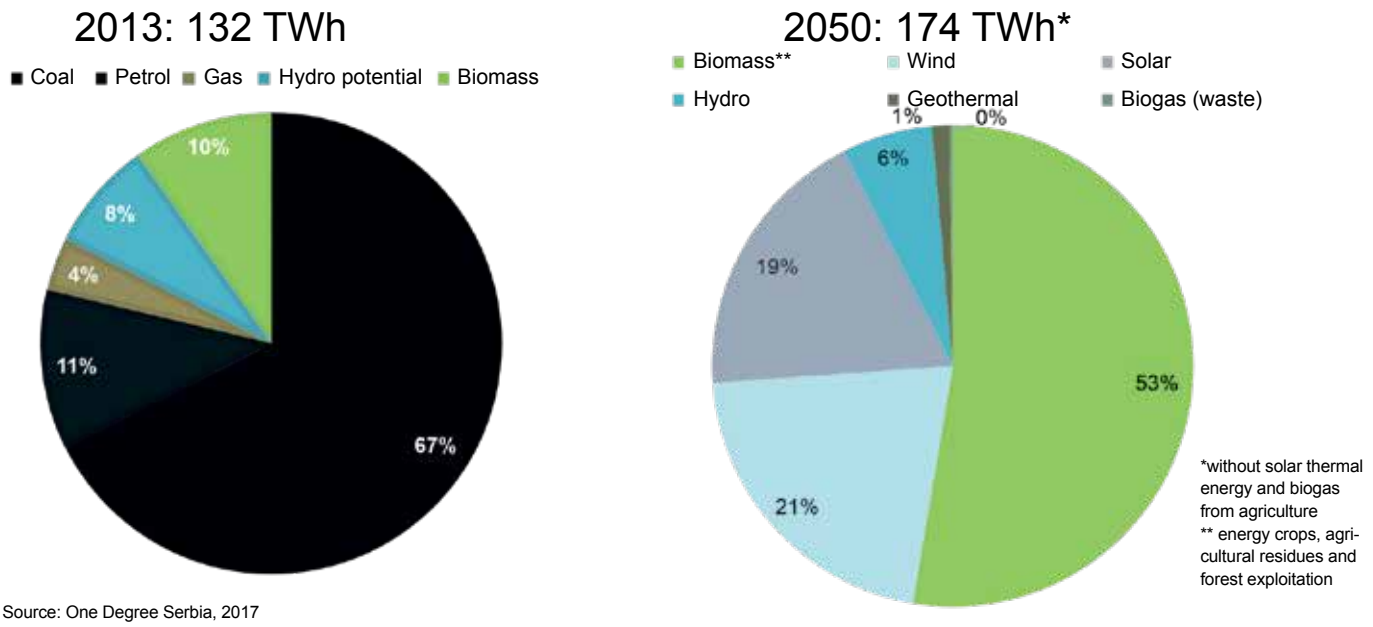
significant loss of biodiversity and the negative impact on civilization and recognize that we cannot limit greenhouse gas (GHG) emissions and curb the fossil fuel sector. Keeping at one degree is safe, at two is not," founder of the association Djordje Samardzija says. He also adds that the organization's main idea is to get citizens, as well as all sectors of society, join the global climate action, above else for the sake of our children's future on whose quality of life climate change will have a great impact.

Immediately after its founding, the organization embarked on a vigorous public awareness campaign which was crowned with the most significant climate event in Serbia until then. In December 2014, in cooperation with the Intergovernmental Panel on Climate Change (IPCC), the Center for the Promotion of Science (CPN) and the Center for Sustainable Development, One Degree Serbia organised the presentation of the IPCC's Fifth Report. And in cooperation with the CPN and the SANU in the winter of 2014/2015, they organized the Fifth Report on Climate Change exhibition.

"The year 2015 was named one of the most important ones when it comes to climate change. The whole world was preparing for the historic Climate Summit in Paris - COP21. The events we organized, their quality, attendance and media coverage gave us reasons to hope that we were on the right track and that we would be able to contribute to the national dialogue on climate change. This dialogue was to be held as part of the preparations for defining the Intended Nationally Determined Contribution to fight the climate change (INDC), which was the crucial national document for Paris. However, this dialogue never took place, and the Government of the Republic of Serbia in June 2015 submitted its INDC to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) without any public debate. The proposal, at first praised by the highest European officials, was very quickly declared inadequate by civil society organizations and media. The project practically did not envisage any reduction in emissions but rather an increase," Samardzija points out.

As the association One Degree Serbia assumed that this would be the case, they started their most important project to date - Alternative INDC in February 2015. The goal of the project was to explore the potential for reducing CO_2 emissions and complete the transition to renewable

"The limit promoted by politicians (+ 2°C) means that we, as humanity, **consciously accept the significant loss of biodiversity and the negative impact on civilization** and recognize that we cannot limit greenhouse gas (GHG) emissions and curb the fossil fuel sector"



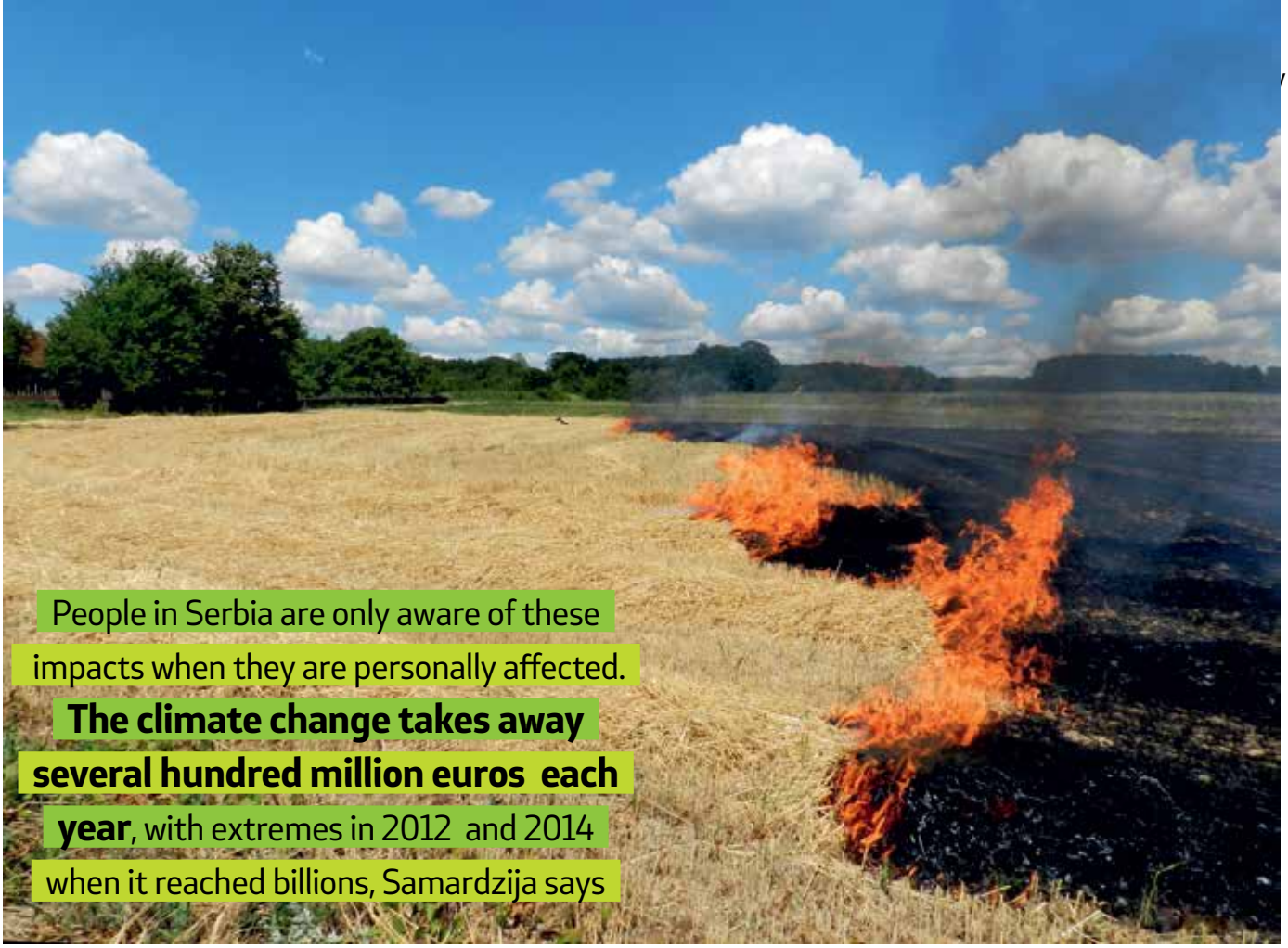
Source: One Degree Serbia, 2017

On the left side is presented the actual energy mix from 2013 based on the Energy Balance data. On the right is the potential energy mix without fossil fuels that could be reached in 2050 with a planned and complete transition to RES.

energy. The main results of the research were that Serbia could obtain all the energy it needs from renewable energy sources, and substantially more than the current consumption. The investment for the transition would cost between $ 3.1 and 6.9 billion dollars, which would annually amount to $ 1.1-2.5 per capita per day by 2050.

The Balkans and the Mediterranean are the regions that will be most affected by climate change, Samardzija said. We are the witnesses of this every year. The floods, heatwaves, droughts, forest fires, the spread of infectious diseases ... People in Serbia are only aware of these impacts when they are personally affected. The climate change takes away several hundred million euros each year, with extremes in 2012 and 2014 when it reached billions, Samardzija says. That's a lot for an economy like ours. According to data from the European organization HEAL, the additional health costs resulting from the production of electricity from coal amount to about 4 billion euros a year. The World Health Organization claims that Serbia loses about 33 per cent of its GDP every year due to air pollution. Such costs could not be compensated by the offset of a much stronger economic growth than we currently have, "Samardzija says. He adds that citizens are the key because they have to vote for politicians who can propose and implement the necessary solutions and support the companies that care about the environment through their everyday decisions about what to purchase.

It is challenging to find anything positive in Serbia when it comes to climate change mitigation, our interlocutor says. The development of renewable energy sources, such as wind, should be commended, but fossil fuel subsidies need to be abolished. However, to begin with, the most important thing is to know how much GHG we emit. "We often hear from public officials that Serbia is a small emitter. However, if the data from the Second National Communication to the UNFCCC is accurate (67 million tonnes of CO_2 eq), it turns out that we emit almost 10 tonnes of GHG per capita per year. That's double the world average. Therefore, we must acknowledge to ourselves where we are and how much we emit. Then we can easily make some 'tough'



People in Serbia are only aware of these impacts when they are personally affected. **The climate change takes away several hundred million euros each year**, with extremes in 2012 and 2014 when it reached billions, Samardzija says

Photographs: Sinisa Ljubisavljevic

decisions, such as the transition to clean energy or taxing the pollutants," Samardzija points out.

One of the major projects of this association which are aimed precisely at reducing the greenhouse effect is the Forests and Climate, which in the competition of the Ministry of Environment in 2018 won the second place out of 291 proposals.

The project was implemented in cooperation with the Center for Development of Non-formal Education for Citizens (CRNOG) and the Serbian Case for Space Foundation (SCS). The project aimed to develop a method for the evaluation of afforestation areas in changed climatic conditions. "With this project, we have opened an important topic. To be specific, forests that absorb significant amounts of CO_2 from the atmosphere should last for tens and hundreds of years. Which also means in conditions altered by climate change. It is therefore crucial that we know what types of trees will be thriving in the future."

One Degree Serbia also hosts Klimaton every month, educational and informative workshops to inform citizens about the problem of climate change. The experience so far has shown that the interest of citizens exists, but it should be much higher. "Through Klimatons, we strive to familiarize citizens with the basic information that accompanies dealing with the challenge of climate change, as well as to emphasize that the participation of every individual is important. So far, we have held a total of 19 Klimatons. Mostly in Belgrade, but we were also in Pirot, Bajina Basta, Novi Sad, Subotica and Kragujevac. We hope that in the future we will have the opportunity to realize some more ideas aimed at greater engagement of citizens and acceptance of awareness of the importance of environmental protection everywhere and at all times" Samardzija concludes.

Prepared by Gordana Knezevic

MORE THAN TWENTY THOUSAND TONNES OF TYRES WERE RECYCLED IN THE FIRST HALF OF 2019

The recycling industry has processed more than 20 000 tons of waste tyres in the first six months of 2019

In a dozen tyre treatment plants in our country, tyres are collected through a collection network organised by recyclers. This network includes its collection system, as well as individuals and legal entity collectors with whom it cooperates. Tyres also get to recycling centres from the waste producers such as tyre repair shops, agricultural goods, landfills, industry, rubber, mining and transportation companies, pneumatic manufacturers and distributors.

In Serbia, the "polluter pays" principle applies, which is derived from the EU legislation. It means that tyre importers and manufacturers are required to pay the environmental tax and this money to be used for safely disposing of tyres when they become waste.

The collection of the environmental tax has been increasing year by year. However, according to information from the Recyclers Association of Serbia, the payment of incentive funds for tyre disposal and all special waste streams has been overdue for more than a year. The incentive has been paid in a lower amount than the waste companies processed. Last year, the state paid 34 per cent fewer incentives for the treatment of waste that has already been collected and processed by recyclers. A total of 42,000 tonnes of tyres were treated last year. It follows that treatment of 14 million kilograms of tyres remains unpaid, the Association remarks. By the time the third quarter ends, recyclers will have not yet received a dime of incentive funds.

The process of recycling waste tyres is not a highly profitable business, because the incentive funds cover only

Photograph: Unsplash/donnehhhh

a fraction of costs of the collection network, waste transportation and the challenging and expensive treatment technology of this type of waste. Only a high-volume production and a placement of products derived from the recycling process can generate some profit.

Adverse effects of waste tyres on the environment

The Association points out that waste tyres belong to special waste streams, along with batteries, accumulators, waste oils, waste from electronic and electrical products. They require special waste management from the place of generation, collection, transportation and treatment. Otherwise, they can have negative consequences on the environment and human health if inadequately disposed of.

When properly discarded, waste tyres do not cause soil, water and air pollution. However, there are some situations with a potentially adverse impact on the environment, which is mainly related to tyre's high flammability and the risk of fire in landfills.

By improper tyre burning, the smoke that contains many harmful substances is released into the atmosphere. Toxic gases dioxins and furans, which negatively affect human health and the environment are emitted and often have a high carcinogenic effect. Also, the melting of tyres produces liquid contaminants that penetrate the soil and can be hazardous if they reach the surface and groundwaters.

Due to their shape and specific density, pneumatics cannot be disposed of in a way where the available space is efficiently used, which, as a consequence, requires the provision of large landfills. During the warm rainy season, the interior of a tyre in a landfill is partially filled with water and becomes a breeding ground for mosquitoes, rodents.

New products from recycled rubber granules

The tyre recycling process produces rubber granulate (65 per cent), steel wire (35 per cent) and fabric (5 per cent). The separation of the components is done by the action of a magnet and air current. The only energy source used is electricity. No chemical reagents or thermal reactions are used, so no waste substance is generated. It is especially important that there is no environmental pollution in this process as a side effect.

The rubber granules obtained by cutting the tyres are manufactured in different sizes depending on dimensions that companies require for further production. The smallest dimension to which a tire is recycled is half a millimetre. The steel wire is used in foundries and thus returned to the production process, and cement plants most commonly use the fabric as fuel.

Recycling of tyres conserves resources because of variety of products that can be made of rubber granulate, such as substrates for sports fields, children's playgrounds, linings for roof insulation, floor insulation material, sound barriers in construction, waterproof membranes, porous bituminous binder, rubber tubes, trash cans, aggregate for asphalt mixers for road construction, auto parts (brakes, interior components, steering wheels, bulkheads), barn linings and others.

Photograph: Aleksandar Mijalković

GOOD BUZZ TRAVELS FAST!

There is a risk that the groceries which are **a daily sight for us** in markets and in plates will **only be available in museums** to our descendants

Would you believe us if we revealed to you that one Belgrade-based marketing agency with around 40 employees during just one day in April expanded its working capacity with 72,000 new members spread across five offices? If we told you as well, that their new workers are potentially smaller than the nail on the thumb of your hand, would you perhaps assume that they are – bees?

Following the recent discoveries of the Japanese, the team of "Kreativa Unlimited" agency found themselves at the Sava estuary. Scientists from the land of the rising sun detected that the stay in nature doubles the level of one's creativity. And what is more important to people who made a promise to their clients about having an inexhaustible source of interesting ideas than the eternal inspiration? For this very reason, "Kreativa Unlimited" moved to a raft across the Great War Island eight years ago.

In order to repay nature for its contribution in making successful collaborations for many years, this marketing agency decided to put some hives on the roof of its object. The employees of the company thus joined the Bundestag MPs, City Hall of Copenhagen officials, Paris Opera performers and Astoria Hotel managers in New York who had already become "urban beekeepers" a few years ago. They also planted a garden on the terrace – the fruits produced there feed both them and the bees.

"We are proud to be the first Serbian company that is engaged in urban beekeeping, and we hope to get competition very soon. It is important that we made the first step, so Belgrade is now listed on the map of European cities on whose roofs bees live and work", says Stevisa Vujasinovic, PR manager of "Save the Bees" project.

Urban beekeeping represents a practice of keeping bee colonies in cities and, according to our interlocutor, is a growing trend worldwide. By following it, you will be helping honeybees that are also affected by climate change, in addition to other disasters.

If you do not see yourself as a bee saviour, then save yourself. Keep in mind the immense benefit of these valuable insects for the human diet. They pollinate inter alia around 200 crops, and it is estimated that, due to their extinction, as many as 100,000 plants would disappear from the face of the earth.

The population of bees has been declining uncontrollably in recent years. "Their endangerment is a global phenomenon," Stevisa emphasizes, adding that in some parts of the United States they have already been declared an endangered species. Due to the severity of the problem, the Chinese are forced to pollinate with specially designed tools, but it seems impossible to replace the bees in a makeshift manner.

Given the fact that it has the biggest number of hives per capita, Serbia doesn't feel the devastation of the crisis to the same extent as other countries, but the recent bee deaths in Vojvodina have concerned the public.

The importance of their cultivation in urban areas is manifold both from the perspective of ecology and from the point of view of economics.

Photographs: Kreativa Unlimited

MUSEUM OF NATURAL HISTORY 2019 – MUSEUM OF STILL LIFE 2119

To vividly depict all the food without which our kitchens will be left in case of bee extinction, "Kreativa Unlimited" opened its futuristic "Museum of Still Life 2119" in June. Stevisa described the setting as their way to project the not-so-distant future in which, unless we enable the survival of the bees, generations to come will live.

"Human activities are degrading the environment and consequently, animal species. Bees are one of them. Maybe someone would think that we could survive without honey, but these insects play a much more important role. It is enough to mention that they provide us with every third bite by pollinating", Stevisa explains.

Visitors to the museum had the opportunity to see apples, lemons and cauliflower on pedestals. There is a risk that the groceries which are a daily sight for us in markets and plates will only be available in museums to our descendants. Is that the planet we want to leave to our children?

Long-standing agency partner "Hemofarm" proved that the greening consciousness of the companies is contagious. Once the exhibition at the estuary has ended, it moved the warning museum to its Sustainable Development Center in Prote Mateje Street. However, it is currently closed due to renovation, and our readers will be informed in due time when it will see the light of day again.

A MANIFESTO ON THE PRESERVATION OF BEE POPULATION

1. Grow honey plants (lavender, sage, saffron, calendula...)
2. Educate yourself on the topic of sustainable beekeeping and practise it
3. Spread knowledge and experience on bee protection
4. Protect the environment and natural resources

Beekeepers are claiming that the population of city apiaries is healthier and more productive than their relatives from the village and that it gives a huge contribution to the local biodiversity. Although urban beekeeping is most often a hobby and not the primary source of finance for a household, the experts are emphasizing that a family of four could support itself by taking care of around fifty beehives.

WHY BEES ARE MIGRATING FROM VILLAGES TO CITIES?

Migration from rural to urban areas is not exclusive to people only. We don't know if city bees, like the girls in the song by ITD band, always lie - but we know the cause of their relocation.

Spraying ticks and mosquitoes from the air and the irresponsible use of pesticides in agriculture threaten insects. Starting fires in fields is another danger from which bees are seeking salvation in cities. The fleeing swarms hide in various crevices of houses and buildings, in attics and trees. Sometimes the motive of their escape is the overpopulation of the space in which they lived, so society splits, and each team goes their way.

Unfortunately, not every pursuit of bees for a happier life ends – successfully.

Inhabitants of Belgrade are not used to the "buzzing" neighbourhood and are scared of stings, so insects often get hurt. More aware citizens, on the other hand, call the SOS Bee Rescue Service. Its head is Sladjan Simonovic. "Kreativa Unlimited" collaborates with him as well.

Depending on the situation, the service shakes the bees down or vacuums them or removes the whole honeycomb with the brood. The insects are then taken to quarantine after which. The service finds them a new home. In the spring, it receives up to one hundred calls a day.

By rough calculations, in the capital of Serbia there are around 5,000 bee communities that are not under the control of beekeepers. They are self-contained and reproduce independently and provide food.

Research by the Faculty of Agriculture has shown that honey from Belgrade-based bees is, by all standards, good for human consumption.

Honey is a superfood. Thanks to a high content of simple sugars, vitamins and minerals, it is easily digestible and, after getting in the body, it goes directly to the bloodstream. Listing its positive characteristics, no matter how long it goes, will always end in et cetera. "Honey regenerates tissue, eliminates pain, improves heart function, increases resistance, has a calming effect on the nervous system, regulates blood pressure, reduces elderly weakness, strengthens mental abilities, et cetera," Stevisa notes and announces the possibility of branding "Kreativa Unlimited" honey from next year.

It shouldn't be overlooked that the joint cooperation and diligence of bees and beekeepers is also resulting in royal jelly, propolis, wax and bee venom.

Ecology is one of the aspects of corporate social responsibility, so we took the opportunity to ask Stevisa whether clients of his marketing agency recognize the need to take part in improving the quality of their environment. "One of the companies that have hired us focuses on the specific goal of sustainable development every year, and it implements projects tailored to local needs in different countries. Last year we worked on Belgrade sparrows' protection. Since the company in question is a manufacturer of alcoholic beverages, this year we collected bottles thrown from cafes and clubs and made sculptures from them," he replies.

Activities in the field of bee conservation "Kreativa Unlimited" implemented in cooperation with the creative hub "Nova Iskra" and the environmental organization "Ekonaut" within the project "Bee Connected". This project is based on renting and maintenance of hives for socially responsible companies and individuals who have a desire to have an apiary in their space.

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