NR. 44 ■ 2025

ENERGY PORTAL magazine

ISSN 2560-6034

Climate--Resilient Cities Through Sustainable Architecture and Green Infrastructure

Gabriel Derighetti
Ambassador of Switzerland to Bosnia and Herzegovina

Switzerland – A Model of Sustainable Urbanism and Nature Protection

FEATURE TOPIC
[GREEN ARCHITECTURE]

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ENERGY PORTAL MAGAZINE
Bimonthly publication
energetskiportal.com

Address:
Bulevar Oslobođenja 103/3
11010 Belgrade

e-mail of the editorial board:
info@energetskiportal.rs

Publisher:
CEEFOR Ltd, Belgrade

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

620.9

ENERGY portal magazine / editor-in-chief Nevena Djukić. - Štampano izd. - 2017, no. 9 (nov.)- . - Belgrade : CEEFOR, 2017- (Zemun : Birograf). - 30 cm

Dvomesečno. - Drugo izdanje na drugom medijumu: Energy portal magazine (Online) = ISSN 2560-6034

. - Ima izdanje na drugom jeziku: Magazin Energetskog portala (Štampano izd.) = ISSN 2560-5232

ISSN 2560-6026 = Energy portal magazine (Štampano izd.)

COBISS.SR-ID 259518988

Dear readers,

As autumn slowly dresses the landscape in golden tones and the air turns crisp, it is the perfect moment to pause and devote a few quiet moments to yourself — in the warmth of your home, with inspiring and helpful reading material. If you are holding the latest issue of the Energy Portal Magazine in your hands, know that once again, we have prepared rich content filled with stories, interviews, and analyses that connect ecology, energy, and sustainable development.

The central theme of this issue is sustainable architecture, because green building and thoughtful living represent one of the key steps toward reducing greenhouse gas emissions and mitigating climate change. The fact that buildings are responsible for approximately 40 percent of global carbon emissions clearly demonstrates the importance of viewing construction through the lens of sustainability.

In this issue, we explore how innovative biomaterials can transform the construction sector and how certification systems evaluate the energy performance of buildings and their broader environmental impact.

We also present the concept of National Park Cities (NPC), which offers a vision of urban environments where nature and everyday life intertwine harmoniously. Although they are not traditional national parks, these cities remind us that green spaces and healthier lifestyles are an inseparable part of a sustainable future.

We spoke with Gabriel Giger, Ambassador of Switzerland to Bosnia and Herzegovina, who shared insights into how Switzerland is tackling the challenges of climate change — from global warming to glacier melting — as well as which environmental protection projects the embassy supports in the region.

This issue also features an interview with Boris Jerinić, Mayor of Doboj, who discusses the city's long-term plans to improve its environmental outlook, enhance waste management, and mitigate the risks of natural disasters, such as floods.

Finally, we take special pride in highlighting that CEEFOR has marked 15 years of sustainable operations and contribution to the transformation of the regional energy landscape — an inspiring example for all of us who believe in the green transition.

You can also look forward to a range of carefully selected stories, each illuminating, in its own way, the importance of knowledge, innovation, and responsible action in shaping a more sustainable everyday life.

Nevena Đukić
editor-in-chief

Photographs: (top) Ivana Todorović; (cover) Ivana Todorović

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SWITZERLAND – A MODEL OF SUSTAINABLE URBANISM AND NATURE PROTECTION

Gabriel Derighetti

Ambassador of Switzerland to Bosnia and Herzegovina,

Switzerland ranks among the world's leading countries in nature protection and waste management, and its experience shows that long-term sustainability must lie at the very heart of environmental protection. This requires reliable monitoring systems that enable continuous assessment and adaptation of measures in line with global and local developments, technological progress, and innovation. We learned more about how this country protects nature, manages waste, and fights climate change from the Ambassador of Switzerland to Bosnia and Herzegovina, Gabriel Derighetti.

Q: Which practices from your country in the field of nature protection and waste management do you consider applicable to Bosnia and Herzegovina?
A: Decisions made in sectors such as urban planning, energy, transport, agriculture, and healthcare have a direct impact on nature and the environment. Environmental protection must be integrated across all these sectors — and in a long-term manner.

Switzerland has had a relatively high rate of waste generation per capita, leaving a significant environmental footprint both within the country and beyond its borders. Our response has been to strengthen the circular economy, and we have been working intensively in this direction for several years. By strengthening the circular economy, the environmental impact — both domestically and abroad — will be reduced throughout the entire life cycle of products and structures, material cycles will be closed, and resource efficiency will be improved.

The Swiss Constitution promotes nature protection and sustainable development and obliges institutions at all administrative levels to ensure a long-term balance between human needs and environmental protection. Through a series of strategies, laws, and mechanisms, measures are being implemented that yield tangible results. Such an approach can serve as a valuable guide for Bosnia and Herzegovina in developing its own sustainable and inclusive environmental protection policies.

Q: Climate change also affects the Alps, particularly through glacier melting. What measures is Switzerland taking to address this challenge and protect its natural resources?
A: Climate change is a global phenomenon that manifests differently across various regions. Like other Alpine countries, Switzerland also feels the effects of climate change on its landscapes. Due to accelerated glacier melting, the risks of avalanches and landslides are increasing. Scientific studies warn that glaciers could disappear by 2100 unless greenhouse gas emissions are drastically reduced globally. In the future, changes in water regimes and the availability of water resources can be expected in Switzerland and downstream countries, as major European rivers such as the Rhine, Rhône, Po, and Danube are fed by water from Alpine glaciers.

This will also have economic consequences — particularly for ski tourism, which must move to higher altitudes, and for hydropower production. Although specific local solutions, such as covering glaciers to slow melting, are being applied, these are too costly and unsustainable. The only long-term, sustainable solution is strong global prevention — that is,

Photographs: (on the previous page) Pixabay; (Derighetti) courtesy of Gabriel Derighetti

a drastic, coordinated reduction in emissions.

Over the past two decades, Switzerland has managed to reduce its environmental impact per capita, especially in the areas of air quality, forest biodiversity, natural hazard management, resource efficiency, and waste management. Through its long-term climate strategy, Switzerland aims to become a country with net-zero greenhouse gas emissions by 2050.

Q: Your country supports environmental and climate protection projects in Bosnia and Herzegovina. Which of these do you consider the most significant so far?

A: Switzerland provides support to institutions in Bosnia and Herzegovina at all levels of government in addressing climate-related challenges. Our projects focus on long-term, systemic solutions, with disaster risk reduction (DRR) as a priority. Some of these interventions focus on improving the efficiency and quality of public utility services in water supply, wastewater management, district heating, urban planning, disaster management, and strengthening the circular economy. We support local utility companies in enhancing the efficiency of water services and district heating through systemic and infrastructural measures.

Climate change certainly has a particular impact on people's lives in urban areas, which is why Switzerland has ensured the transfer of knowledge and new technologies to improve urban planning systems.

Our experience shows that the fastest results are achieved at the local level, but the sustainability of solutions requires coordination with higher levels of government. In Bosnia and Herzegovina, the decision-making process is often inefficient, which poses a serious challenge and risk to sustainable development. The Western Balkans as a region is particularly vulnerable to climate change due to its climatic, geographic, and socioeconomic characteristics.

Bosnia and Herzegovina, much like Switzerland, needs to reduce emissions and adapt to the new realities created by climate change.

Switzerland supports civic engagement, activism, and youth entrepreneurship through programs such as *Youth for Change*, in partnership with the Mozaik Foundation

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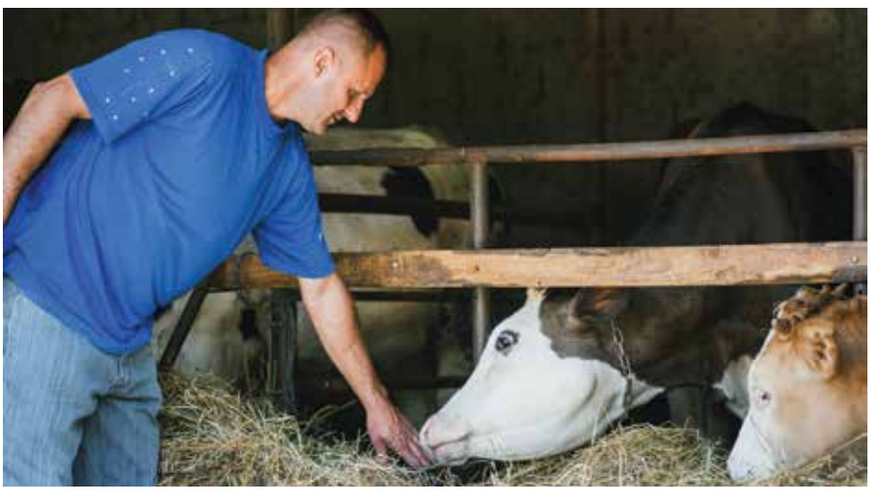

However, the lack of political will and the rigidity of administrative mechanisms remain obstacles — a challenge faced by many other countries as well.

Q: Renewable energy sources are key to the energy transition. Does Switzerland plan to invest in solar or hydropower projects in Bosnia and Herzegovina?

A: The energy independence and security of every country largely depend on the efficient use of renewable energy sources. Bosnia and Herzegovina has significant potential to develop these resources. Switzerland continues to promote green practices and provides support for improving regulations and assisting local authorities in implementing energy efficiency and renewable energy measures.

Direct investments, however, belong to the private sector. We encourage Swiss companies to explore opportunities, but actual decisions depend on market conditions, risks, and regulatory stability.

Swiss companies already operating in Bosnia and Herzegovina are actively investing in solar and other renewable energy sources. Their motivation is twofold: reducing production costs and preparing for mechanisms such as the Carbon Border Adjustment Mechanism (CBAM), given that, in addition to the Swiss market, they are primarily oriented toward the EU market. Their experience shows that the private sector in Bosnia and Herzegovina recognizes the value and economic justification of such investments.

Switzerland will continue to cooperate with the authorities in Bosnia and Herzegovina to create a favorable framework and facilitate access to concessional financing to accelerate the green transition. Certain

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financial instruments already exist, such as the SECO Start-up Fund, which provides Swiss investors with favorable credit resources for investment and greening of production, as well as the Swiss Investment Fund for Emerging Markets (SIFEM), which operates through local banks and private equity funds — thereby opening up opportunities for Bosnia and Herzegovina to mobilize additional resources for its energy transition.

Q: The concepts of recycling, waste reduction, and the circular economy are becoming increasingly important. How is Switzerland helping Bosnia and Herzegovina advance in this area?
A: Switzerland promotes the circular economy by setting an example — starting with its own embassies, including ours in Bosnia and Herzegovina. We have introduced waste separation, reduced paper use and printing, and installed solar panels and a heat pump. We also exchange experiences with Swiss companies operating in Bosnia and Herzegovina on sustainable business practices aimed at reducing their environmental footprint.

Within the framework of the Bosnia and Herzegovina–Switzerland partnership for achieving the global Sustainable Development Goals (SDGs), we organize activities to promote the circular economy — particularly during SDG Week in October, when Swiss companies share their experiences in the fields of sustainability and environmental protection.

At the regional level, Switzerland supports the Green Agenda for the Western Balkans, helping countries align their policies with EU standards. In cooperation with institutions and the private sector, we are planning long-term initiatives to integrate the principles of the circular

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A: Young people are at the center of Switzerland's cooperation with Bosnia and Herzegovina. We believe their potential can be utilized even more effectively. To ensure their voices are heard, the Embassy established its own Youth Advisory Board (YAB). The members, selected annually through a public call, take part in strategic discussions, provide feedback on project proposals, and help set priorities. We are currently forming the fifth generation of the YAB.

Switzerland supports youth employment in Bosnia and Herzegovina by strengthening the vocational (dual) education system to align with labor-market needs — particularly in the green and digital economy. The goal is to equip young people with skills that will enable them to respond to real job opportunities and become the backbone of development. Furthermore, we support stronger connections between academia, institutions, and the business sector, as well as access to

economy into business processes in Bosnia and Herzegovina.

Q: What role do young people and educational institutions play in your projects? Do you see them as key drivers of change in the future?

new technologies, especially in the field of digitalization.

Switzerland also supports civic engagement, activism, and youth entrepreneurship through programs such as *Youth for Change*, in partnership with the Mozaik Foundation. This initiative enables young people to launch projects and social enterprises within their communities, with financial and mentoring support provided through Mozaik's platforms, such as *Youth Bank* and *Impact Incubator*.

In Switzerland, young people hold positions of responsibility because they are regarded as key drivers of change and an investment in the future — and that is exactly what we aim to encourage in Bosnia and Herzegovina as well.

Q: What are the priorities of the Embassy of Switzerland in Bosnia and Herzegovina in the coming years?

A: Switzerland remains committed to supporting Bosnia and Herzegovina in building a peaceful, democratic, and cohesive society and in advancing toward European integration. The Swiss Cooperation Program for Bosnia and Herzegovina for the period 2025–2028 focuses on local governance, a sustainable economy, migration, and healthcare. Our goal is to work together with partners in Bosnia and Herzegovina to strengthen institutions, improve migration management, and promote good governance. We support the growth of the private sector, the development of the green and digital economy, vocational education, and innovation.

Our priorities include cooperation with authorities at all levels to increase the efficiency of the public sector, encourage employment through a developed and dynamic private sector, and highlight positive stories that can inspire change across Bosnia and Herzegovina.

Switzerland also promotes social cohesion, federalism, decentralization, and cantonal cooperation — values deeply rooted in our own experience. As a neutral and credible partner, Switzerland encourages dialogue among communities and offers a European perspective based on trust and long-term cooperation.

Interview by Jasna Dragojević

Photograph: Pixabay/Gianfilippo Maiga

RESILIENCE TO EXTREMES AND REDUCING FLOOD RISK AS PRIORITIES FOR DOBOJ

Cities across the region are making great efforts to become environmentally conscious communities focused on reducing pollution, preserving natural resources, and improving the quality of life for their residents. Environmental protection has become a key priority in urban development, with growing emphasis on implementing green policies, expanding urban greenery, and encouraging the use of renewable energy sources. The city of Doboj, which was among the hardest hit by the catastrophic floods in Bosnia and Herzegovina in 2014, now stands as an example of a community that has undergone recovery and strengthened its resilience to natural disasters. However, aware that climate change brings new challenges, the city of Doboj continues to develop projects aimed at increasing resilience to extreme weather conditions.

We spoke with Boris Jerinić, the Mayor of Doboj, about the city's greatest environmental threats, energy efficiency measures, and urban planning goals and strategies.

The goal is for Doboj to be recognised as a destination that nurtures sustainable values, where tourism goes hand in hand with environmental protection and the improvement of residents' quality of life

Photographs: The city of Doboj

Q: To what extent can tourism, particularly through the Gradina Fortress and the area's natural wealth, serve as a driver of Doboj's sustainable development?

A: Tourism can become one of the key pillars of Doboj's sustainable development. The Gradina Fortress, as a cultural and historical monument by the Bosna River and surrounded by rich natural landscapes, offers exceptional potential for the development of cultural, adventure, and eco-tourism. The city recognises that tourism is not only about attracting visitors but also about creating new jobs, developing small and medium-sized enterprises, supporting local food production and crafts, and promoting local products and traditions. In this way, tourism becomes a driver of economic growth and a means of preserving cultural and natural heritage. The goal is for Doboj to be recognised as a destination that nurtures sustainable values, where tourism goes hand in hand with environmental protection and the improvement of residents' quality of life.

Q: How would you assess the current environmental situation in Doboj, and what are the biggest threats to the environment?

A: The environmental picture of Doboj is improving, although there are still serious challenges we face daily. The greatest threat is air pollution during the winter months, caused by the use of solid fuels for household heating. Another major challenge is climate change, which brings heavy rainfall and the risk of flooding. The city of Doboj is aware of these threats and is taking steps to reduce their adverse effects – through investment in infrastructure and public education. The long-term goal is for Doboj to develop into an environmentally responsible and sustainable city.

Q: Is the city planning investments in renewable energy sources, energy efficiency, and the renovation of public buildings?

A: Yes, this area ranks high on the city's list of priorities. In 2020, the town of Doboj developed the Sustainable Energy and Climate Action Plan (SECAP). This plan outlines specific measures to increase energy efficiency, transition to renewable energy sources, and reduce greenhouse gas emissions, primarily in public buildings. In line with this, the city is already implementing projects to improve the energy efficiency of public buildings through wall insulation, window replacement, and modernisation of heating systems. There are also plans to install solar panels on the roofs of schools and administrative buildings. Furthermore, in cooperation with international organisations, Doboj is developing projects that enable the transition to cleaner energy sources and reduce harmful gas emissions. Such investments not only yield financial savings but also directly improve air quality and protect the environment.

In 2020, the town of Doboj developed the Sustainable Energy and Climate Action Plan (SECAP). This plan outlines specific measures to increase energy efficiency, transition to renewable energy sources, and reduce greenhouse gas emissions, primarily in public buildings

Boris Jerinić
Mayor of Doboj

Photograph: (Jerinić) courtesy of Boris Jerinić

Q: How is Doboj currently addressing the issue of waste disposal, and are there plans to invest in recycling infrastructure?

A: Waste management remains one of the biggest challenges. At present, most waste is disposed of at the Regional Sanitary Landfill, but we are aware that this is not a long-term solution. Therefore, the city has launched initiatives to develop recycling infrastructure, including installing separate containers for plastic, paper, and glass. Plans also include building a recycling yard and investing in public education to raise awareness about the importance of waste separation. Through cooperation with the private sector and non-governmental organisations, we aim to establish a system in which waste becomes a resource rather than a problem.

Q: Air quality is a particularly sensitive issue during the winter months - what measures are being implemented to improve it?

A: The city is aware that air pollution during the winter period is a serious problem. The main source of pollution comes from individual household heating systems, which use coal, wood, and even waste materials, leading to increased concentrations of harmful particles in the air. In this regard, measures are being implemented to encourage households to switch to environmentally friendly energy sources, as well as long-term programmes for the energy renovation of residential buildings, which the city has defined in the Rulebook on the Establishment and Functioning of the Co-Financing Model for Energy Efficiency Measures in the Residential Sector of the City of Doboj. At the same time, efforts are

The Doboj Fortress and Mount Ozren

Doboj is one of the larger urban centres in the Republic of Srpska and an important regional hub thanks to its favourable geographical position at the confluence of the Bosna, Usora, and Spreča rivers. The city is best known for the Doboj Fortress, a symbol of its history and strategic significance. It was built on a cone-shaped rocky hill above the valley of the River Bosna, opposite the mouth of the River Spreča. The surrounding area abounds in natural resources, most notably Mount Ozren, known for its thermal springs, medicinal herbs, and forest expanses, as well as its peaks Velika Ostravica (918 m) and Gostilj (773 m).

being made to expand green areas, which act as natural air filters.

Q: What activities are being carried out to protect the River Bosna and other watercourses?

A: The River Bosna and its tributaries represent one of Doboj's most important natural resources. For that reason, the city is working to control wastewater discharge and modernize the sewage network. Investments are also being made in riverbank protection, tree planting, and riverbed maintenance to reduce the risk of flooding and erosion. Various projects and initiatives are being implemented to clean the riverbanks and educate residents about the importance of preserving the river.

Q: Since the floods, how prepared is Doboj today for climate change and extreme weather conditions?

A: The experience of 2014 was a painful lesson, but also a motivation to take flood risk management seriously. Today, Doboj is much better prepared – embankments and protective barriers have been strengthened, early warning and crisis coordination systems have been introduced, and significant funds have been invested in improving infrastructure.

However, climate change poses new challenges, so the city continues to develop projects to increase resilience to extreme weather, in cooperation with both domestic and international partners.

Q: Are there plans to expand green spaces and protect the natural environment as part of the city's urban development?

A: The expansion of green spaces is one of the key priorities in urban planning. The city of Doboj is growing rapidly, and this development is accompanied by the creation of new green areas and the maintenance of existing ones. Planting new tree lines along newly built streets is a regular city activity, as is integrating green spaces into new residential and commercial buildings. The goal is for every resident to have access to green and recreational areas within their immediate vicinity. This improves quality of life, enhances the microclimate, reduces the effects of urban heat islands, decreases pollution, and increases the city's resilience to climate change. The urbanisation of Doboj will not be measured only by the number of new buildings but also by the amount of preserved and improved natural space.

Interview by Jasna Dragojević

MONTENEGRO ON THE PATH TO SUSTAINABLE CONSTRUCTION

Sustainable architecture forms the foundation of sustainable housing, which in turn represents one of the key elements in reducing the carbon footprint of cities, and consequently, of the entire country. However, the nations of the region are only beginning this process – taking small but significant steps towards integrating the principles of sustainability into the foundations of new buildings.

How can the rapid development of cities, new investments, and infrastructure projects be harmonised with the preservation of cultural and natural heritage and the modern requirements of sustainability? We discussed these topics with Mirjana Đurišić, Acting General Director of the Directorate of the Chief State Architect at the Ministry of Spatial Planning, Urbanism, and State Property of Montenegro.

Q: Sustainable architecture is becoming a crucial topic in contemporary construction. Which trends in this field do you recognise as the most significant in Montenegro, and what are your goals for the coming period regarding the development of sustainable practices?

A: In line with Montenegro's declaration as an ecological state and its strategic commitment to joining the European Union, a consistent and integrated approach to sustainable development has been established. This commitment has been reinforced through a series of international obligations, including the Geneva Protocol and the Energy Community Treaty, as well as the adoption of the Kyoto Protocol, and through align-

Photograph: Unsplash/Dean Milenković

ment with the EU's ambitious goals regarding emissions reduction and increased energy efficiency.

In this context, a key turning point in the field of sustainable architecture was achieved in 2016 with the introduction of the mandatory Energy Efficiency Study. This document ceased to be a luxury and became a fundamental tool compelling all actors in the construction sector to address energy saving more seriously, providing concrete indicators of building quality.

As the most significant trend, we are pleased to highlight the increasingly widespread use of complex façade systems with a high degree of thermal insulation. This has become a new quality standard, both in the public sector – through the renovation and construction of schools and institutions – and in the development of high-end tourist resorts, business facilities, and hotels. Alongside this, we are continually working to raise investor awareness of the long-term benefits of energy efficiency, which has been further encouraged by a clear regulatory framework.

Our ultimate goal is for sustainable solutions to become an indispensable, rather than an additional, part of every architectural project. Therefore, our aim in the coming period is to enhance this trend through improved regulatory frameworks and an integrated approach to achieving national sustainable development goals.

Considering that the construction of physical structures inherently involves integrating social and environmental issues into tangible forms, I believe that the field of planning and construction has a key role and responsibility in this process. This is why I would like to emphasize the importance of a correct and healthy approach to sustainable architecture, as it enables us to build not only buildings but also a sustainable future for our society.

Q: Architecture today must find a balance between aesthetics, functionality, and energy efficiency. In your opinion, what is the recipe for achieving this harmonious combination in design and construction?

A: The recipe for such harmony lies in an integrated design process, where energy efficiency is not a late addition but a fundamental design parameter from the very beginning. When the concept of energy efficiency – through proper orientation, form, arrangement of openings, and choice of materials – is considered at the earliest stage, it naturally merges with aesthetics and functionality. Projects that optimise daylight and natural ventilation significantly reduce reliance on artificial systems, creating savings embedded in the very fabric of the building.

The key to success, as always, lies in cooperation. When it comes to state institutions and decision-makers, there must be interdepartmental institutional cooperation and constant dedication and commitment to the process of sustainable development. Here, I am referring to cooperation between the Ministry of Spatial Planning, Urbanism, and State Property, which deals with planning and construction, the Ministry of Public Works, the Ministry of Ecology, Sustainable Development, and Northern Region Development, the Environmental Protection Agency, and all other relevant institutions. Only after that should come the cooperation of architects, engineers, builders, and investors, who must work together from day one, based on sound decisions by state institutions concerning sustainable development and sustainable architecture, which is also a key factor in the healthy development of our country. When all these factors and elements align, the result is not only energy savings but also authentic architecture of high aesthetic and living quality

Mirjana Đurišić

Acting General Director of the Directorate of the Chief State Architect at the Ministry of Spatial Planning, Urbanism, and State Property of Montenegro

– architecture that is both more beautiful and smarter.

Specifically, when it comes to sustainable architecture, it should not be seen simply as greening or the installation of solar panels. We must remember that our participation in building structures leaves an indelible mark on the earth. Every choice – every brick, window, or beam – carries weight. We cannot afford to build structures that consume resources and suffocate the planet under the guise of progress. Sustainable architecture is not a whim; it is a necessity.

By building according to the principles of sustainable architecture, we work to minimise harm and, even more importantly, to actively nurture the environment while enhancing people's quality of life and well-being.

With rapid urbanisation and the expansion of cities, the use of green roofs in architecture has become not only an ecological necessity but also an expression of creativity.

When speaking about sustainable construction, it is essential to mention adaptation to climate change,

Photographs: (Đurišić) Jelica Bujić; Unsplash/Laurynas Zizys

which the entire planet is currently facing, and where the creation of sustainable and more resilient urban environments is of vital importance. To mitigate the heat island effect, various measures must be implemented in urban areas, including the use of green roofs and vertical green walls. Apart from significantly enhancing the aesthetic value of buildings, these measures can also considerably reduce energy consumption compared to buildings with conventional flat roofs.

Following global trends, Montenegro is currently preparing secondary legislation to regulate standards for planning residential neighbourhoods and tourist complexes. Among other things, this legislation will set rules for installing green roofs on buildings and encourage this measure by allowing such surfaces to be partially included in the calculation of the prescribed greening index of a plot.

Q: Looking at the state of existing buildings in Montenegro, what would you identify as the weakest point of most structures, and which fundamental aspects should be prioritised for improvement?

A: The weakest point of most buildings, particularly those constructed in the second half of the 20th century, is their lack of energy efficiency. These buildings are real energy sieves. They have minimal or no thermal insulation, outdated window frames, and inefficient heating systems. The consequences are enormous heat losses, high heating costs for residents, and increased emissions of harmful gases.

For this reason, a significant amount of work has been undertaken in recent years on thermal rehabilitation as a national priority. Our focus is on making this process more accessible to citizens through funding and incentive mechanisms. This is not merely a matter of saving money but also of improving the quality of life and protecting the environment.

Apart from energy issues, Montenegrin cities – particularly those along the coast - also face the problem of excessive residential construction, which has "swallowed up" much of the public space. This problem brings with it a range of consequences, including congested traffic and a worrying lack of quality green spaces. Another major issue is the planning of parking spaces.

Parking is often solved by constructing underground garages beneath the entire plot. As a result, the courtyards of buildings cannot be used for planting parks or tall trees, since there is no space for roots to grow, leaving only bare concrete with minimal greenery.

The way forward lies in returning to the principles of sound urban planning. We must strive to draw on the postulates of the Yugoslav socialist period, which emphasised functional zoning, green corridors, social infrastructure, and a focus on openness and light. Housing blocks were situated within green rings, with large parks, sports grounds, and children's playgrounds integrated within residential areas. The goal was to provide residents with direct access to nature and recreation. The buildings were spaced apart generously, ensuring sufficient sunlight and ventilation.

The main goal is to achieve a healthy lifestyle and contact with nature, even within urban environments. These very principles – respect for green spaces, the creation

of self-sufficient neighbourhoods with infrastructure, and human-scale planning – are now recognized as a valuable legacy worth revisiting in addressing the challenges of overdevelopment and dysfunctional urban areas. They remind us that urban planning is not merely about constructing housing, but about creating healthy and humane communities.

Of course, our task is not simply to replicate the past but to reinterpret it intelligently. The city of the future is not a collection of static buildings but a living organism that breathes, learns from the past, adapts to the present, and cares for the future. It is a smart, green, and humane environment that respects the fact that we are merely temporary stewards of a space that will outlive us. Only when we realise that we are caretakers, not owners of that space, can we begin to build for future generations – on the proper foundation of sustainability.

Photographs: (top) Unsplash/Krzysztof Kotkowicz; (bellow) Unsplash/Laurynas Zizys

The city of the future is not a collection of static buildings but a living organism that breathes, learns from the past, adapts to the present, and cares for the future

Q: New laws and regulations often provide a strong impetus for change in practice. Could you provide more information about the regulations that will influence construction standards in Montenegro in the future, particularly those related to energy efficiency and sustainability?

A: Absolutely! It is precisely through the regulatory framework that we achieve the most significant changes. In its efforts to address the challenges of energy inefficiency and unsustainable construction, Montenegro has taken key steps this year on both the legislative and strategic levels. The new regulations will not only encourage changes in practice but also lay the groundwork for an entirely new standard in the construction industry, one that is directed towards a sustainable future.

As highlighted, the Ministry of Spatial Planning, Urbanism and State Property has introduced new, fundamental legal acts – the Law on Spatial Planning, which will regulate how space, as the most valuable resource, is planned and used, taking into account the protection of nature, cultural heritage, and community needs; and the Law on Construction of Buildings, which will comprehensively regulate the construction process itself, from design to commissioning, to improve the quality, safety, and functionality of buildings.

To ensure these two laws are aligned and directed towards a common goal, the drafting of the National Strategy for the Development of Architecture is currently underway. This document is of strategic importance, as it will consolidate legislative solutions and establish a clear vision for the future. The National Strategy for the Development of Architecture, particularly in the part concerning the improvement of the built environment's quality, will be crucial for promoting sustainable architecture. The ultimate goal is clear: to establish a foundation for the application of sustainable principles in every aspect of the construction process.

We are adopting these acts with the awareness that the space we build is a shared heritage, not private property. Therefore, it is our duty to ensure that the legal framework is both firm and inspiring – one that encourages innovation, respects nature, and fosters the creation of humane communities. These regulations represent the first and most important step in laying the foundations for Montenegro's sustainable future.

Q: There is growing discussion about the importance of using natural and recycled materials. How prevalent are sustainable materials in Montenegrin architecture today, and what potential do you see for their broader use?

A: Their current presence is, unfortunately, still marginal. They are mostly used in smaller, specific projects or by a handful of environmentally conscious investors. In large-scale construction, although thermal insulation materials are used, they are rarely natural materials such as stone wool, cellulose, or cork.

However, the potential is enormous. Montenegro has a long tradition of using natural materials (wood, stone) and an opportunity to develop the production and application of materials such as wood fibres, hemp, and recycled materials. The wider application will depend on incentives, investor and designer education, and the development of domestic supply. This is not merely a matter of ecology but also of creating authentic, contemporary architecture that harmonises with our landscape and identity.

Q: Rooftop solar panels are becoming almost standard practice in modern cities. Does Montenegro plan to further encourage the integration of renewable energy sources into new residential and commercial buildings, and what role does the architectural profession play in this?

A: Yes, this is an absolute priority. Montenegro's solar potential is exceptional, and its utilisation is imperative. In addition to existing measures, incentives such as subsidies and favourable loans are being considered for the installation of solar panels – both thermal (for hot water) and photovoltaic (PV) systems.

The architectural profession plays a key role: solar panels must not be simply tacked onto roofs as an afterthought. They must be integrated into the architectural concept, planned within the design, and installed in a way that does not compromise the building's aesthetics, ideally as an integral part of the roof plane or façade (BIPV – Building Integrated Photovoltaics). Our task is to design buildings that not only save energy but also generate it themselves, bringing them closer to the concept of "energy-plus" buildings.

Interview by Milena Maglovski

"POWER PLANTS 2025": TRADITION, KNOWLEDGE, AND A VISION FOR THE FUTURE OF ENERGY

For decades, the "Power Plants" conference has brought together leading experts and representatives of the energy sector from Serbia, the region, and around the world, confirming its status as one of the most important professional events in the field of energy.

This year's edition, titled "Power Plants 2025", will be dedicated to current topics of energy transition, capacity modernization, the development of renewable energy sources, and emerging technologies such as hydrogen and process digitalization. We spoke with Dejan Cvetinović, PhD, President of the Organizing Committee of E2025, and Predrag Stefanović, PhD, President of the Serbian Society of Thermal Engineers, about the importance of the conference, its evolution, and the key themes it will address.

Q: The "Power Plants" conference has a long tradition. Could you tell us more about the history of this event, and has it been gaining importance over the years, especially considering its international character?

Cvetinović: The "Power Plants" conference has a long and continuous tradition spanning several decades. From its very beginning, the goal was to bring together leading experts in the field of energy — from Serbia, the region, and abroad — to exchange knowledge and experience. Over time, the conference has grown into a well-recognized event of international significance, with interest increasing year after year. This is confirmed by the steady rise in the number of participants and partners, as well as by the growing diversity of topics, which reflect current global challenges in the energy sector. Thanks to this continuity, the conference has become a reference point for all stakeholders who wish to stay informed about the latest trends and developments in the energy industry.

Q: The main focus of this year's conference will be on key topics for the energy sector — what will be at the center of attention at "Power Plants 2025," and how many papers have been submitted this year?

Stefanović: This year's conference will place particular emphasis on energy transition, modernization of existing capacities, and the integration of renewable energy sources into the power system. We are also highlighting the importance of hydrogen, digitalization of processes, security of supply, and new models of energy storage. The high level of professional interest is reflected in the large number of papers submitted — both from Serbia and abroad — for "Power Plants 2025," which confirms the relevance and timeliness of the topics to be discussed. The conference will also feature detailed presentations of projects focused on the revitalization and modernization of power facilities in the region, the integration of renewables into the energy mix, and the development of pumped-storage hydropower plants as a key balancing component for the growing share of renewable energy sources. Additionally, discussions on the

Illustration: courtesy of Dejan Cvetinović

prospects of nuclear energy and its role in ensuring the long-term stability of the power system will be an important part of the program.

Q: Who will make up the professional and business community at the conference, and can we expect a significant number of international guests?

Cvetinović: The conference will bring together a unique blend of professionals and the business community. We expect the participation of representatives from electric power companies, regulatory bodies, the academic sector, research institutes, and companies developing advanced energy technologies. We are particularly pleased that we will also host a large number of lecturers and participants from abroad, as international exchange of ideas and experiences adds significant value to the event and reaffirms its regional and European relevance. In this way, the conference becomes not only a professional forum but also a bridge of cooperation connecting domestic capacities with the best practices from Europe and the world.

Q: What is the significance of such an event for Serbia and the region, and how does it contribute to the exchange of knowledge, experience, and investment ideas?

Stefanović: An event like this holds multifaceted value for Serbia and the region. It enables the exchange of professional knowledge and best practices, creates space for networking between researchers and industry, and encourages the launch of new investment and development initiatives. The conference also contributes to strengthening Serbia's role as a regional hub for energy and energy innovation. It is particularly important to emphasize that such events help create the preconditions for faster integration of the region into European frameworks and for improving the overall investment environment.

Q: The energy sector in Serbia and the region is undergoing major changes. How do events like this help shape and guide the sector's development, especially in the context of energy transition and alignment with European regulations?

Cvetinović: The energy sector in Serbia and the region is going through a profound transformation — from decarbonization and harmonization with European regulations to the modernization of thermal power plants and increased use of renewable energy sources. Events such as the "Power Plants" conference provide a framework for open dialogue between science, industry, and policymakers, helping to shape strategic development directions. They not only follow but also guide the energy transition, offering solutions that are technically, economically, and environmentally sustainable. In this way, the conference has a direct impact on shaping energy policy and on decision-making processes that will determine the course of power sector development in the decades to come.

Q: The most important energy projects in Serbia and the region will also be among the conference topics. Which projects will be discussed, and what message would you share with our readers regarding their importance for the future of the energy sector?

Stefanović: The conference will present key energy projects from Serbia and the region, including projects focused on the modernization of thermal power plants, integration of large renewable energy capacities, development of hydrogen infrastructure, as well as initiatives aimed at improving energy efficiency and reducing CO_2 emissions. Our message to the public is that these are projects of exceptional importance for energy security, economic competitiveness, and environmental sustainability. They represent a path toward a modern energy system, aligned with European and global trends, and serve as a guarantee that Serbia and the region will be ready to face future challenges. Additionally, special attention will be devoted to the role of pumped-storage hydropower plants in balancing the energy system, as well as to the consideration of nuclear energy as a long-term option for stable supply and sustainable development.

Dejan Cvetinović, PhD

President of the Organizing Committee of E2025

Predrag Stefanović, PhD

President of the Serbian Society of Thermal Engineers

Interview by Milena Maglovski

Photographs: (Cvetinović) courtesy of Dejan Cvetinović; (Stefanović) courtesy of Predrag Stefanović

DIGITALIZATION AS THE KEY TO SECURE AND SUSTAINABLE ENERGY DISTRIBUTION

The energy sector is undergoing the most dynamic transformation in recent decades. The growing need for greater efficiency, a stable supply, and reduced negative environmental impact has made digitalization an indispensable part of every modern power system. To learn more about how Siemens is addressing these challenges, we spoke with Bojan Janković, Head of the Electrical Products organizational unit at Siemens d.o.o. Belgrade.

Q: The energy sector is facing numerous challenges — from growing consumption to the need for greater sustainability. How is Siemens responding to these demands?

A: Today, it is more important than ever to ensure a stable, efficient, and sustainable energy supply. At Siemens, we have developed a concept for intelligent low-voltage power distribution, which leverages digitalization to enhance efficiency, reduce maintenance costs, and improve system safety. In this way, digitalization is not merely a technical addition but a key link in the energy transition.

In addition, Siemens applies its DEGREE framework, which sets clear guidelines and goals throughout the entire business chain, creating a secure path toward sustainability. This approach includes, for example, circular product design, predictive maintenance, and optimization prior to implementation through technologies such as the digital twin.

Photo-illustration: Siemens

Q: One of the most frequently mentioned terms is energy efficiency. How does the digitalization of low-voltage systems specifically contribute to this process?

A: To reduce consumption, we must first know exactly where energy is being used. Our monitoring and metering solutions enable complete transparency. In practice, this means that users can identify energy pockets — areas where energy is consumed inefficiently — and optimize their processes accordingly. Based on industry experience, digital monitoring can deliver energy savings of up to 30 percent, representing a significant advantage both for companies and for society as a whole.

Q: In addition to savings, system maintenance is also a major challenge. What do Siemens' solutions offer in this regard?

A: The traditional approach — waiting for a failure to occur and then reacting — is no longer acceptable. Every power outage means losses for both operators and users. That's why our systems enable preventive and predictive maintenance, which involves collecting real-time data, analyzing it, and predicting potential failures. In this way, system availability can be increased by up to 15 percent while simultaneously reducing maintenance costs.

Q: Digitalization also brings new risks, primarily cyberattacks. How do you address them?

A: Exactly — once systems become digital, they automatically become targets. That's why we apply the defense-in-depth principle, meaning multi-layered protection. Security is ensured on several levels — from physical protection of facilities, through network security, to cybersecurity functions integrated directly into devices. This ensures that energy distribution remains reliable, safe, and resilient to attacks.

Q: How does digitalization impact the process of planning and constructing energy systems?

A: The progress in the planning process is significant. Today, software tools such as SIMARIS Suite enable designers to create a digital twin of a facility and simulate all potential challenges before implementation begins. Combined with BIM technology, the number of subsequent modifications is reduced by up to 40 percent, and the overall project execution time is significantly shortened. This means that investors receive faster, more reliable, and more cost-effective solutions.

Q: What happens after the system is commissioned — how is long-term efficiency ensured?

A: That's where our monitoring and management tools come into play, such as SENTRON Powercenter 3000 and SENTRON Powermind. These platforms collect and analyze data in real time, either locally or via the cloud. Operators gain complete insight into the system's condition and energy consumption from any location. This enables them to respond quickly and make data-driven decisions that improve both efficiency and safety.

Q: How do field devices integrate into the digital infrastructure?

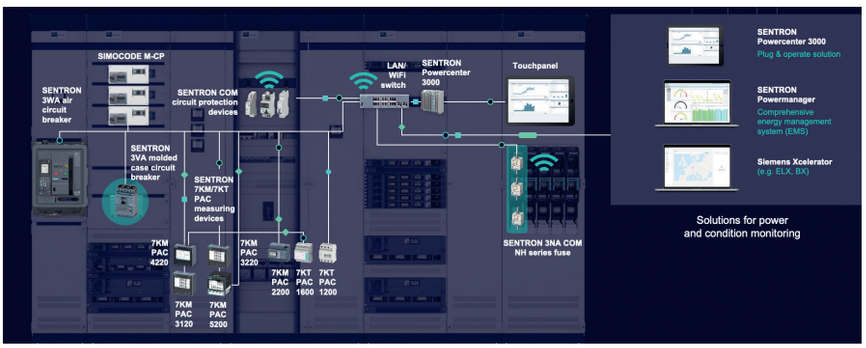
A: Field devices are the core of the digital system. Our SENTRON series circuit breakers not only perform protection functions but also measure and share data. SIMOCODE devices control motors and collect diagnostic information, while SIRIUS soft starters ensure safe and controlled motor start-up. In this way, every component becomes an active part of a unified, intelligent system.

Q: What would be your key message for industry and society?

A: The digitalization of energy systems is not a story about the future — it is happening now. Those who adopt it in time will gain a more stable, efficient, and sustainable infrastructure, one that is ready to meet all the challenges of the 21st century. At Siemens, we believe this is the right path toward a secure energy future.

Interview by Milena Maglovski

Bojan Janković
Head of the Electrical Products organizational unit at Siemens d.o.o. Belgrade



Photograph: (Janković) courtesy of Bojan Janković • Photo-illustration: Siemens

SUSTAINABILITY CERTIFICATES – STANDARDS SHAPING MODERN BUILDINGS WORLDWIDE

Sustainable construction is today one of the key directions in contemporary architecture and urban planning. It reduces negative environmental impacts, encourages the rational use of resources, and improves the quality of life for building users. In this process, certification systems play a crucial role, as they assess not only the building's performance but also its wider impact on the environment, society, and economy through a holistic framework. They provide proof of quality and guidance for continuous improvement in building performance, whether in new construction, refurbishment, or the management of existing buildings. Below are three widely recognized systems that serve as examples of such a comprehensive approach.

Photographs: (top) Pixabay/TheVisualEngineer; (bottom) Unsplash/jwvaneck

BREEAM

The oldest of the three certification systems discussed in this text is BREEAM, developed in 1990 in the United Kingdom by BRE Global, a part of the British Building Research Establishment (BRE). It was the first standard for assessing sustainability in construction and infrastructure. BREEAM is known for its holistic approach – it evaluates not only the building itself but also its broader context and its impact on the environment, society, and the economy. Data show that millions of buildings worldwide now apply the BREEAM methodology.

All BREEAM activities comply with ISO 9001— the international standard defining quality management system requirements for organizations

Assessment includes the quality of design and construction, the use of low-carbon, durable, and responsibly sourced materials, and energy and water efficiency through various systems and technologies that reduce maintenance costs. Environmental impact encompasses biodiversity enhancement, waste reduction, and resilience to climate change. In terms of the social aspect, user well-being is assessed through indoor air quality, thermal comfort, and daylight, as well as broader factors such as community integration through connectivity, access to services, and the creation of social value.

BREEAM standards enable the sustainability of a building to be assessed and monitored throughout its entire lifecycle. The system comprises four main schemes: New Construction, aimed at new buildings; Refurbishment & Fit-Out, which evaluates the sustainability of refurbishments and interior adaptations of existing structures; In-Use, which helps investors, owners, and managers improve the operational performance of buildings; and Communities, which supports planners, local authorities, and investors in integrating sustainable design into masterplans for new communities and regeneration projects.

Each BREEAM assessment is conducted and verified independently, ensuring that certified buildings meet the promised standards of sustainability and quality. The results are displayed through a star rating on the certificate. Ratings range from the basic level, Acceptable (available only for the In-Use standard), through Pass, Good, Very Good, Excellent, to the highest level – Outstanding, awarded to projects achieving more than 85 percent of the total points.

The impartiality of assessments and compliance with BREEAM standards are ensured through a Quality Audit (QA) – an independent review of the conducted assessment carried out by the accredited body BRE Global Ltd. All BREEAM activities comply with ISO 9001—the international standard defining quality management system requirements for organizations.

LEED

LEED (Leadership in Energy and Environmental Design) is one of the most widespread international systems for certifying sustainable buildings. It was launched in 1998 and developed by the U.S. Green Building Council (USGBC), an organization based in Washington, D.C. The certificate is issued by Green Business Certification Inc. (GBCI), an independent body that conducts the assessment and confirms that buildings meet the required criteria.

This certification system is also adapted to various stages of a building's lifecycle, with six schemes accordingly. BD+C (Building Design and Construction) applies to new buildings and major renovations of existing ones. O+M (Operations and Maintenance) refers to existing buildings that have been in use for at least a year and focuses on their improvement. The ID+C (Interior Design and Construction) scheme is used for interior fit-outs, while ND (Neighborhood Development) focuses on planning and developing neighborhoods and urban districts. Residential has a narrower scope, focusing on housing

LEED v4 and LEED v4.1 are still in use, but in 2023, the latest version, LEED v5, was published and is expected to become the leading assessment standard in the coming years

Photograph: Pixabay/blazejosh

projects, whereas Cities and Communities has the broadest, designed for assessing entire cities or communities.

There are several versions of the LEED standard. LEED v4 and LEED v4.1 are still in use, but in 2023, the latest version, LEED v5, was published and is expected to become the leading assessment standard in the coming years. This rating system brings updated guidelines and improvements to the certification process and applies to various categories – BD+C, ID+C, and O+M.

To ensure consistency, LEED includes two key tools in its assessment process. The Scorecard is a table used to track project progress against set criteria. The Certification Guide is an essential tool in the form of a manual that provides detailed instructions and information on required documentation and scoring criteria. Based on the points collected, a building can be awarded one of four levels - Certified, Silver, Gold, or Platinum.

LEED certification is applied in more than 180 countries, and the Hung Kuo Building is an example of an office building in Taiwan that has received the LEED v5 certificate in the O+M category, meaning an existing building that has been upgraded. The building, which dates back to 1989, covers over 60,000 square meters. Through its improvement, reductions have been achieved in energy and water consumption, as well as in waste generation. Between 2021 and 2022 alone, energy consumption was reduced by 10.25 percent, while in 2021, compared to 2020, it decreased by 10.65 percent. In addition to these criteria, attention was focused on improving users' health and well-being. This example demonstrates that even decades-old buildings have the potential to be transformed into highly efficient ones.

DGNB

The final certification system discussed was established in 2007 and, although younger than the previous two, today represents the largest European network for sustainable construction and the second largest in the world. It originated in Germany as a non-profit association, the Deutsche Gesellschaft für Nachhaltiges Bauen – German Sustainable Building Council. Certificates are issued directly by the DGNB through its network of authorized auditors and consultants.

The DGNB system is based on a holistic approach that encompasses the environment, people, and economic efficiency. The certification criteria are continuously developed to keep pace with changes and adapt accordingly. Since the system is applied globally, the criteria are adjusted to local, climatic, and cultural construction methods. Owners, investors, or designers engage authorized DGNB auditors and consultants who assess projects of various types (new construction, renovation, or urban developments) in accordance with DGNB criteria. The process includes verifying compliance with environmental, economic, technical, and socio-cultural standards. Depending on the achieved results, projects are awarded certificates in one of four categories: Bronze, Silver, Gold, or Platinum.

The DGNB system is based on a holistic approach that encompasses the environment, people, and economic efficiency. The certification criteria are continuously developed to keep pace with changes and adapt accordingly

In addition to certification, DGNB also offers an educational component designed for professionals worldwide. Through its academy, participants gain knowledge about the principles of sustainable construction, certification criteria, and the practical application of standards. All of this contributes to the development of a network of international experts who promote and implement sustainable practices in the construction industry.

Prepared by Katarina Vuinac

ABB HOME AUTOMATION IN THE SERVICE OF ENERGY EFFICIENCY

Imagine a home that not only responds to your needs but also actively contributes to energy savings. Modern smart architecture integrates technologies that ensure optimal consumption, rational use of resources, and greater living comfort.

The ABB-free@home® system embodies these principles – enabling every house, apartment, or building to become an energy-efficient environment without the need for complex installations or wiring.

Whether it's a new build or a renovation, this system offers a flexible, simple solution for automating lighting, heating, blinds, and other consumers – ensuring maximum energy savings with minimal construction work.

At the heart of the system lies ABB OneTouch – an intelligent control panel that enables centralized management of all home functions

Photographs: ABB

ABB OneTouch – The Command Center of an Energy-Conscious Home

At the heart of the system lies ABB OneTouch – an intelligent control panel that enables centralized management of all home functions. Through its seven-inch screen, users can control lighting, room temperature, ventilation, music, and even monitor security cameras or the video intercom.

Thanks to the integrated System Access Point, the entire system can be commissioned via an app without additional software. OneTouch connects up to 150 devices, allowing complete home automation with precise monitoring and optimization of electricity and heat consumption.

The device supports the Matter standard, the universal language of smart devices, enabling seamless integration with a wide range of energy-efficient systems – from LED lighting to smart home appliances and HVAC devices. In this way, ABB OneTouch becomes the brain of the building, coordinating all consumers and contributing to the reduction of overall energy consumption.

Wireless Revolution – Smart Renovation Without Construction Work

In energy retrofitting projects, a frequent challenge is how to modernize electrical installations without extensive work or additional costs. The wireless version of the ABB-free@home® system makes this possible – device installation requires no additional wiring, wall drilling, or replacement of existing infrastructure.

Smart Switches operate without batteries, using energy-harvesting technology – they generate energy themselves when pressed. This eliminates cables and batteries, reduces fire load, and simplifies installation.

The solution is ideal for energy-efficient renovations of apartments, houses, and public buildings, aiming to improve comfort and reduce energy consumption without additional construction work.

A System That Grows – From Simple Solutions to Complete Automation

ABB-free@home® enables gradual system expansion—from basic functions such as lighting and blind control to complex systems that manage heating, cooling, and ventilation.

This enables households or business spaces to evolve according to budget and needs, while improving energy efficiency step by step.

The system's flexibility makes it ideal for modular construction, prefabricated buildings, and smart energy-efficient facilities that require adaptive solutions and digital energy monitoring.

Smart Scenarios for Rational Energy Consumption

Imagine lights dimming when you leave a room, heating automatically lowering during the night, or blinds descending to prevent overheating in summer. All these actions contribute to reducing energy consumption and CO_2 emissions, while maintaining maximum user comfort.

ABB-free@home® enables such scenarios to be set automatically, adapting to daily routines and weather conditions. In this way, the building becomes an active participant in energy efficiency — not just a consumer.

Smart Technology for a Sustainable Future

Smart buildings are no longer a luxury but a necessity in an era where energy and ecology are central themes of modern living.

By integrating systems like ABB-free@home®, architecture becomes not only functional and aesthetically advanced but also energy intelligent.

Every automated lighting scene, every precise temperature adjustment, and every kilowatt-hour saved represents a step toward a more sustainable future.

ABB-free@home® – because energy efficiency begins at home

For more information contact ABB in Serbia:
13 Bulevar Peka Dapčevića St.
vanja.dugosija@rs.abb.com
www.abb.rs

ECOLOGICAL INDEX – A NEW PARAMETER FOR A HEALTHIER AND GREENER BELGRADE

The Ecological Index (EI) is a concept proposed in the current planning document to be introduced as a new urban planning parameter in Belgrade's planning practice, alongside standard urban parameters. Essentially, the EI is a numerical value expressing the ecological significance and contribution to quality of life provided by different forms of vegetation on an urban plot. It serves to assess both the quantity and quality of urban greenery. The greatest challenge to its implementation lies in the inadequate and insufficiently detailed representation of the microclimate and the existing morphology of built structures, which makes it difficult to monitor the effects of applying the EI, not so much due to technological constraints, but rather financial, temporal, and organizational ones. The introduction of a ratio between ecologically effective surfaces and the total plot area was first implemented in Berlin in 1994, under the name Biotope Area Factor (BAF). Afterward, numerous cities developed their own versions and terminology.

The ability to choose and combine different EFPs and their respective surface areas on or around a structure allows for flexible implementation tailored to the specific conditions of each plot

Photograph: Unsplash/Gabor Molnar

Key parameters for measuring the Ecological Index

The elements that contribute to determining the EI are various forms of vegetation on the plot. For specific types of vegetation, or "ecologically functional spaces" (EFP), such as plants rooted directly in porous soil, plants in soil substrates of different depths, trees of varying sizes, green roofs and facades, bioretention areas, and so on, a weighting factor (WF) is defined depending on ecological significance. The same principle is applied to semi-porous and porous surfaces, rainwater collection systems, and all structures that help mitigate the adverse effects of climate change. For example, green areas in direct contact with the soil have the highest WF, which is 1.0. This indicates that this type of vegetation provides the greatest ecological benefit to the plot and the urban environment. Green areas located above underground structures have a significantly lower WF, depending on the depth of the soil in which the plants are rooted. Depending on the size and diameter of the tree crown, trees are assigned a WF between 0.3 and 0.9. A green roof with a soil substrate up to 30 cm deep has a WF of 0.4, while one with a soil substrate of 30 cm or more has a WF of 0.7. As can be seen, alongside the selection of EFPs, the weighting factor is one of the key parameters for measuring the EI. Also essential are the surface area occupied by each ecologically functional space and the total plot area.

Anica Teofilović
MSc in Urban Planning and Landscape Architecture Engineer

Taking these elements into account, the EI expresses the ratio of ecologically functional surfaces to the total surface area of the plot. It is calculated by multiplying the surface area of each EFP by its corresponding WF, summing the results, and dividing that sum by the total plot area.

The ability to choose and combine different EFPs and their respective surface areas on or around a structure allows for flexible implementation tailored to the specific conditions of each plot. This represents an important advantage of the model, as it allows for design freedom as long as the required proportion of ecologically significant and other areas – that is, the prescribed target ecological index for the specific location – is achieved.

The EI contributes to sustainable development and the city's adaptation to climate change. By introducing a target EI as a quantitative parameter in urban planning and by designing solutions to achieve the required target EI, standardisation of

Photographs: Unsplash/Jovan Vasiljević; (Teofilović) courtesy of Anica Teofilović

environmental quality management is achieved.

In the implementation of the planned target EI, it is valuable for citizens to take part, primarily on the plots where they live, especially on plots used for collective housing. According to the Law on Communal Activities, residents are allowed to make decisions regarding improvements, works, maintenance, and the use of shared parts of buildings (such as plots, facades, roofs, etc.). Local government also plays a significant role in applying this parameter by contributing to its implementation through promotion, initiating activities, organising residents, providing funding, subsidies, incentives, and more. The economy can directly benefit from the production of elements necessary for implementing the EI (plants, constructions, irrigation systems, insulation materials, porous coverings, and so on).

Based on research into the practices of European and global cities in applying the Ecological Index (EI), despite the differences in terminology and the periods when its implementation began, it can be concluded that the applied methods are largely similar, with certain specific features unique to individual cities.

What unites the practice of this method is the fact that the elements used – that is, the Ecologically Functional Spaces (EFP) – are precisely the elements of green infrastructure (GI) at the most detailed level. The term green infrastructure has existed for three decades and was adopted globally during the first decade of the 21st century. The European Union fully embraced the concept of green infrastructure and, in 2013, adopted the Green Infrastructure Strategy, within which GI is defined as "a strategically planned network of natural and semi-natural areas with their ecological characteristics, designed and managed to deliver a wide range of ecosystem services."

In accordance with this Strategy, GI must be developed and planned across all spatial scales, from the national level to the local level (block or plot). At the national and regional levels, these include national parks, forests, lakes, rivers, and wetlands. In contrast, at the city level, they typically consist of urban forests, public green spaces, and green areas (such as courtyards) within plots for public and other uses, featuring various forms of vegetation and nature-based solutions. It is precisely this most detailed level of GI, at the plot or block scale, that comprises the elements (EFP) included in the calculation of the EI.

Currently, the application of this method in urban planning practice in the Republic of Serbia and Belgrade has not yet been established. Currently, as an urban planning parameter, only one of the EFPs is in use – the "minimum percentage of green surfaces in direct contact with the ground." As a recommendation, although rarely in a binding form, guidelines encourage the greening of roofs on above-ground and underground structures, vertical greening, and the use of porous and semi-porous surfaces. However, these are treated as individual elements, without being integrated or calculated as part of a unified ecological parameter.

With the aim of applying global and European experience to Belgrade, attention was first drawn to this topic in 2009 within the Concept of the General Regulation Plan for the Green Areas System of Belgrade. In the adopted Plan* of 2019, the introduction of this parameter under the name Ecological Index (EI) was proposed for the first time. During 2022, the Green Infrastructure in the Compact City – Ecological Index as an Instrument of

* General Regulation Plan for the Green Areas System of Belgrade ("Official Gazette of the City of Belgrade", No. 110/19)

Photograph: Unsplash/Ignacio Brosa

Climate Change Resilience project** was developed. Based on theoretical principles, the project included pilot studies that analyzed and evaluated the existing EI in selected areas, as well as assessed possibilities for increasing the existing EI in selected pilot locations across Belgrade.

Based on a systematic analysis of the potential to increase the EI for specific land-use purposes within Belgrade's urban area, proposals were developed for target ecological indices by zone and planned land use. Furthermore, initiatives were launched to improve public policies at the city level and to introduce the EI into the urban planning process.

Steps towards the wider introduction of the Ecological Index in Serbia

To implement this ecological parameter in Serbia and Belgrade, it is first and foremost necessary to improve the legal framework in various contexts. This involves introducing the concepts of green infrastructure, ecosystem services, ecologically functional spaces and the ecological index, as well as supplementing the content of certain planning documents with these elements, and defining methods of management, maintenance, and so on – primarily within the Law on Environmental Protection, but also within the Law on Planning and Construction, the Law on Climate Change, the Law on Communal Services, the Law on Housing and Building Maintenance, and others.

The Decision on the Preservation and Development of Green Infrastructure in Belgrade is currently being drafted, which will define the framework and obligations for the use of this ecological parameter. The accompanying rulebook will introduce all the necessary elements for applying the Ecological Index in Belgrade.

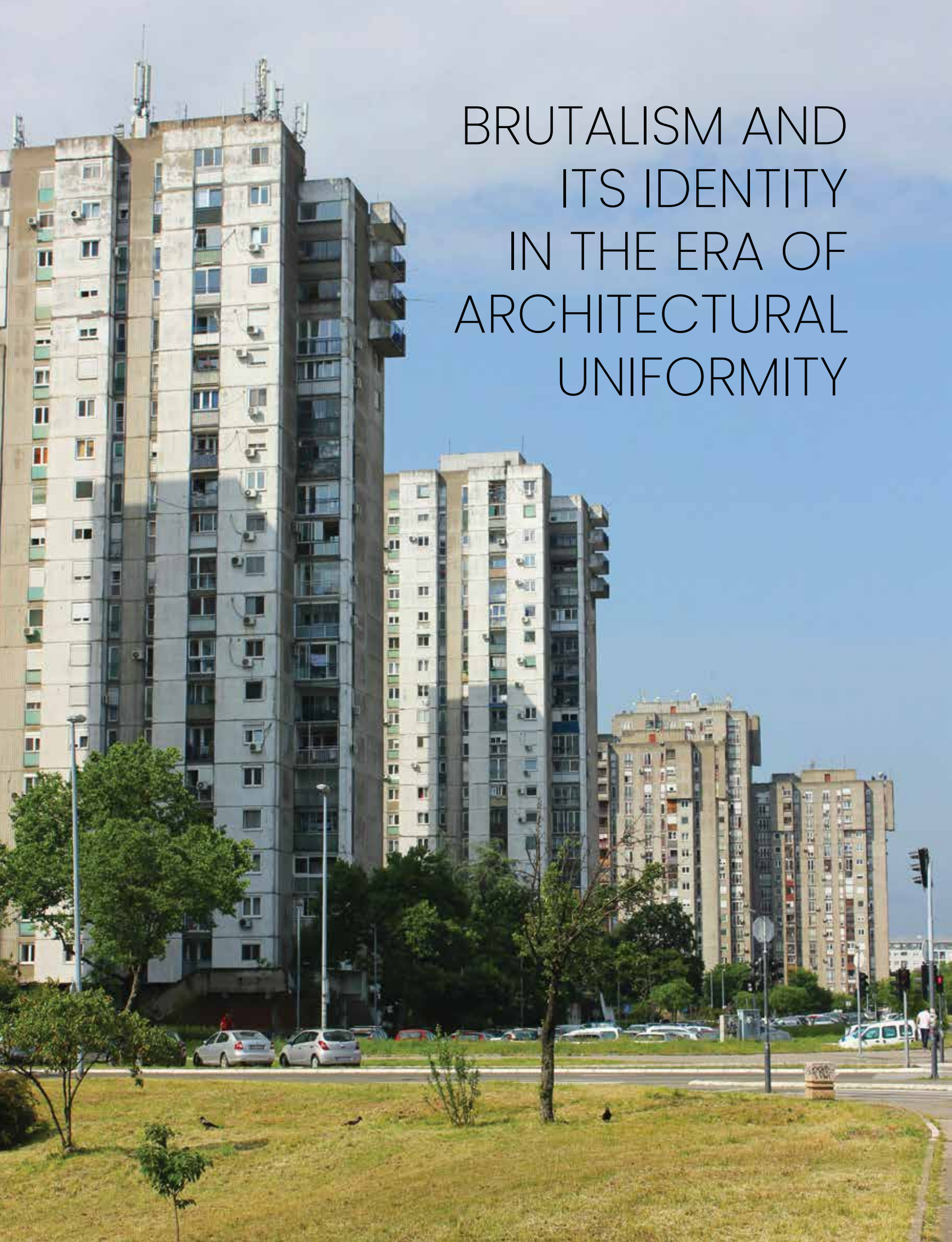
It is also necessary to improve planning documents. For the city of Belgrade, following the needs and recommendations prescribed in the valid General Regulation Plan for the Green Areas of Belgrade, and using the results obtained from the 2022 research project, the Draft General Urban Plan of Belgrade stipulates the introduction of the EI. At the plot or block level, the introduction of ecologically functional spaces (EFP) is proposed as the most detailed element of Belgrade's green infrastructure. Within this framework, a formula for calculating the Ecological Index (EI) is introduced. For certain planned land uses, existing parameters are supplemented with a new one – the target ecological index. A proposal for implementing the EI method has also been defined. The draft plan is currently undergoing expert review.

An essential step is the improvement of public policies at all levels, where objectives or measures relating to green infrastructure and the integration of its elements and functions into legal and planning documents must be defined. Finally, a key step is the dissemination of information and the education of all stakeholders involved in the process of applying this parameter.

Anica Teofilović

** Publication "Green Infrastructure in the Compact City – Ecological Index as an Instrument of Climate Change Resilience", Belgrade, 2022

Photograph: Unsplash/Dimitrije Milenković



BRUTALISM AND ITS IDENTITY IN THE ERA OF ARCHITECTURAL UNIFORMITY

Dušan Ignjatović
Full Professor at the Faculty of Architecture, University of Belgrade

The architectural style that marked the second half of the 20th century—born out of the need for rapid urban reconstruction and characterized by the raw power of materials and simplicity of form—came to be known as Brutalism. The distinctive, rough expression of this movement often provokes divided opinions: while some perceive it as gray, harsh, and cold, others see it as a powerful and socially conscious architectural direction that defined an era. This raises the question—what is the state of the buildings from that period today, and does contemporary residential architecture have the potential to one day evoke similar debates and emotions?

We discussed this topic with Dušan Ignjatović, Full Professor at the Faculty of Architecture, University of Belgrade.

Q: The Aesthetics of Brutalism Are Often Debated. How Would You Explain Its Ideological and Urban Principles?

A: The period following World War II was marked by intense reconstruction and the construction of new urban areas, and in some cases, entire cities. After the initial phase, during which buildings were erected using traditional techniques and materials, industrialization of the process soon followed, introducing modern methods and materials. Reinforced concrete proved to be particularly suitable for residential construction, while the aesthetics of béton brut, which can be compared to what became known as Brutalist architecture, named after the French term raw concrete—became its distinctive visual expression.

Based on the principles of Le Corbusier's architecture, the buildings were designed as pure, cubic forms devoid of decoration, with concrete used not only as the primary structural material but also as the final façade finish. The idea of industrialization was associated with progress and modernization—values regarded as the foundation of an advanced socialist society—while the uniformity of architectural expression underscored the aspiration toward the desired equality of a classless community.

In the former Yugoslavia, solutions for new residential areas and key public buildings emerged through a system of open competitions, resulting in authentic achievements recognized beyond the country's borders. The introduction of new design elements, textures, and expressive forms distinguished these projects from the prevailing architectural practices of both the East and the West. Experiments in form and materialization produced works that became symbols of their era and an invaluable part of the region's architectural heritage.

Q: What Are the Functional Advantages of the Old Yugoslav Residential Blocks, and Why Do They Remain Competitive Today?

A: The period of Brutalist architecture is inextricably linked with the vision of building new cities and transforming the concept of housing. The break from traditional urban patterns was based on the principles of modernism, where the open city block emerged as the fundamental spatial unit. Within such an urban structure—with an abundance of open and green areas—residential "cells" were formed, equipped with complementary facilities such as schools, kindergartens, community

Photographs: (on the previous page Unsplash/Daniela Legotta; (Ignjatović) courtesy of Dušan Ignjatović

centers, as well as sports and recreational facilities.

Although these blocks were initially perceived as empty and impersonal parts of the city—dormitory districts for the new socialist class—the perception gradually changed over time. Their undeniable urban quality, the abundance of open space, availability of parking, well-organized apartment layouts, and solid infrastructure made such neighborhoods desirable places to live. The increased population density in city centers, the changing demographic structure, and the rise in real estate prices have further contributed to the competitiveness of housing from the socialist era.

Q: How Do Brutalist Buildings Compare in Terms of Energy Efficiency, and Does New Construction Perform Better in This Regard?

A: Energy consumption in buildings depends directly on their form, materials, usage patterns—that is, the behavior of occupants—as well as the degree of maintenance over time. Conceptually, buildings from the socialist period often feature articulated, fragmented forms, which increase the surface area of the thermal envelope, meaning the elements of the building through which energy (heat) is exchanged with the environment. Although this can be seen as an unfavorable characteristic in terms of energy efficiency, such forms typically allow for better natural lighting and more effective natural ventilation. This helps mitigate energy losses during the heating season, especially considering that today, nearly the same amount of energy is consumed for cooling in summer as was once used for heating in winter.

The design standards of that time are significantly below today's requirements for energy efficiency, and the degradation of insulation materials used in that era further contributes to the problem. As a result, these buildings consume considerably more energy compared to contemporary structures. According to data from Beogradske elektrane (Belgrade Heating Plants), buildings from earlier periods use between 10 and 30 percent more energy than the average in Belgrade—almost twice as much as buildings constructed according to modern standards.

On the other hand, energy consumption for heating represents only one aspect of residential quality—and it is, in principle, an aspect that can be improved. However, other, often more important aspects—such as spatial organization, orientation, or the structural layout of living spaces—are far more challenging to change, even though they receive much less attention in contemporary residential design.

Energy consumption in buildings depends directly on their form, materials, usage patterns—that is, the behavior of occupants—as well as the degree of maintenance over time

Q: Are There Specific Actions or Recommendations for Improving the Energy Efficiency of Old Buildings, and What Are the Main Challenges in That Process?

A: When it comes to recommendations for improving energy efficiency, a large number of studies have been conducted in Serbia, accompanied by extensive literature that thoroughly explores the principles and possibilities for enhancing the energy performance of buildings. The most comprehensive research was conducted between 2010 and 2013, during which approximately 22,000 buildings nationwide were surveyed. Based on this data, the National Typology of Residential Buildings of Serbia was developed, classifying buildings according to their age, urban characteristics, as well as volumetric and material properties.

In this way, a matrix of characteristic building types was established, for which energy performance calculations were made based on typical construction materials. For each type, models for performance improvement—at both standard and advanced levels—were proposed, including enhancements to the thermal envelope, optimization of heating systems, and domestic hot water preparation systems. The complete material was published in a monograph available to the public, as well as on the website of the Ministry of Construction, Transport, and Infrastructure (stanovanje.gov.rs).

Based on this research, a software tool was also developed, available at eekalkulator.mgsi.gov.rs, enabling users to simulate the effects of improvements on typical building models. By comparing their own buildings with those of similar characteristics, users can gain insight into the potential energy and economic benefits of planned interventions.

The process of performance improvement—defined as energy renovation—brings numerous challenges. Some are related to

Photograph: Pixabay/Đorđe Nikolić

technical characteristics, which are particularly important for buildings of Brutalist architecture. Namely, the question of how to adequately improve buildings constructed in béton brut while preserving their authentic appearance represents a serious challenge—both in terms of technical solutions and implementation costs. Moreover, many of these buildings are large and high-rise structures, which further complicates the process of energy renovation.

Q: What Specific Problems Accompany Old Construction Compared to New Construction?

A: The questions of quality in "old" versus "new" construction are primarily related to housing standards and the role of investors.

Contemporary construction, on the other hand, is oriented toward the free market. Investments are private, and the primary driving forces are demand and profit. In such an environment, building elements not legally required (such as storage rooms, basements, and shared spaces) are often omitted, while others, unfortunately, receive insufficient attention (such as apartment layout, orientation, and exposure to sunlight). Although construction quality should be clearly defined, it is sometimes questionable, and we encounter cases where buildings fail to meet their designed performance standards.

Q: Are Architecture and Construction Today Also Part of the "Fast Life" – and Is Creativity Being Lost in the Process? To What Extent Does Ecology Shape the Face of Architecture?

A: Architecture—whether as an economic sector or as an artistic expression—cannot remain immune to the prevailing trends of contemporary society. Faster, higher, cheaper are the postulates that leave little room for experimentation or a research-based approach. The transcultural imitation of development and construction models has become a common practice, resulting in a globalized visual expression and a noticeable loss of local authenticity. The development of new urban areas, particularly business zones, is characterized by uniformity, making it difficult at times to determine which city—or even which region—we are looking at.

When asked whether creativity is endangered in this process, I would say, of course not—but it is encouraged chiefly in a symbolic sense, and primarily in projects of exceptional economic or social importance. "Ordinary" buildings, with more modest budgets, fall into the category of anonymous acceptability—where architecture is shaped through the use of conventional aesthetic elements, resulting in designs that are widely accepted but rarely provoke strong emotional or intellectual responses.

Ecological architecture has largely aligned itself with this trend; however, it has not contributed to a broader understanding of sustainability.

In the past, the investor was, as a rule, the state or state-owned enterprises. Consequently, compliance with laws and socially defined standards was not questioned. The standards were clearly prescribed. In addition to technical (and therefore thermal) characteristics, spatial and organizational aspects of projects were also regulated. Based on a series of legal and sub-legal acts, construction across Serbia's territory was standardized. From today's perspective, such construction has certain shortcomings—particularly in terms of apartment size and amenities—but the technical aspects of stability and safety are generally not in question.

Instead, it often manifests through recognizable elements that, like "badges," symbolically suggest the supposed qualities of a building. Suppose we view sustainability as an effort to minimize human impact on the environment while preserving development potential for future generations. In that case, architecture must embody a strong local specificity—the ability to respond to sociological, technological, economic, and ecological influences while drawing upon tradition and accumulated knowledge. It is difficult to look toward the future without adequately understanding the past.

Interview by Milica Vučković

The company Center for Energy Efficiency and Sustainable Development

Ceefor

has celebrated its

15th anniversary

reaffirming its leading position in the field of energy efficiency and sustainable development.

Guided by the principles of quality, transparency, and environmental responsibility, CEEFOR has designed a number of solar power plants across Serbia – from Kikinda, Nova Crnja, and Novi Sad, to Belgrade, Kladovo, and Lapovo, all the way to Aleksinac and Vranje.

Over fifteen years of dedicated work, CEEFOR has built a strong identity as a company that not only follows but also actively shapes trends in modern, responsible business practices.


for

15 YEARS OF EXPERTISE, GROWTH, AND INNOVATION

In the pleasant atmosphere of Restaurant 27 in Senjak, the Center for Energy Efficiency and Sustainable Development – CEEFOR celebrated an important milestone – 15 years of successful business operations.

Amid a friendly ambiance, fine wine, and good music, numerous partners and associates joined the CEEFOR team in a celebration that was more than just an anniversary – it was a recognition of fifteen years of dedication, expertise, and innovation.

Over the years, CEEFOR has built a distinct identity as a leader in the field of energy efficiency and sustainable development – a company that not only follows global trends but also actively helps shape them.

Today, CEEFOR proudly holds five internationally recognized ISO certifications – 9001:2015, 14001:2015, 45001:2018, as well as the most recently obtained 50001:2018 and 27001:2022. These standards are not only a testament to quality and responsibility but also proof that all company processes comply with the highest global norms of quality management, environmental protection, energy efficiency, occupational safety, and information management.

Fifteen years of consistent growth and development testify to the company's vision, professionalism, and commitment to adapting to change, responding to market challenges, and remaining true to its core values.

This anniversary is not only a moment of celebration but also an inspiration for new steps ahead – for an even stronger contribution to the energy transition and a sustainable future for our country.

Prepared by Milena Maglovski

Photographs: Ivana Todorović

By 2050,

Switzerland will be a country with net-zero greenhouse gas emissions.

[PAGE 6]

Ceefor

has celebrated of

15 years

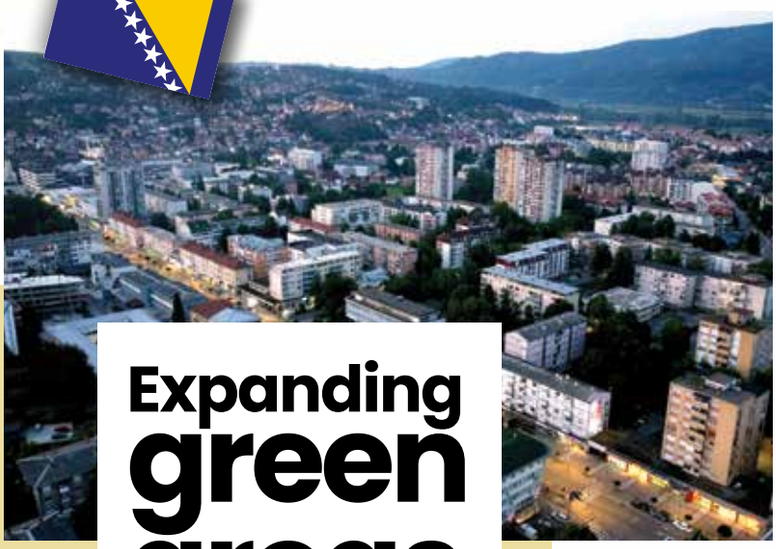
successful business.

[PAGE 38]

Among the top 10 inventions

in the world is the two-stage mechanical oscillator by Veljko Milković.

[PAGE 70]



Expanding green areas

is among the top priorities of the city of Doboj – urbanization is accompanied by new tree-lined streets, parks, and green oases.

[PAGE 12]

New regulations

for planning residential areas and tourist complexes, as well as for the installation of green roofs, are being prepared in Montenegro.

[PAGE 16]

Photographs: (top) Pixabay/JIN.JAE LEE; (middle left) Ivana Todorović; (middle right) courtesy of Veljko Milković; (bottom left) Grad Doboj; (bottom right) Unsplash/Dean Milenković

Researchers from Serbia, Denmark, and Slovenia are developing

a digital carbon footprint calculator

specifically designed for artists working with glass.

[PAGE 82]

The first charger

for electric vehicles in North Macedonia has been installed by Charge&GO.

[PAGE 60]

charge&GO

The only company

in Southeastern Europe with its own development and production of fire alarm control panels is Zarja Elektronika.

[PAGE 50]

The company MT-KOMEX is currently constructing a

5 MW

solar power plant in Novi Bečej.

[PAGE 64]

The system ABB-free@home®

allows any house, apartment, or building to be transformed into an energy-efficient environment without the need for complex installations or wiring.

[PAGE 28]

ABB

Photographs: (top) Elšika Pozdankova; (top right) Zarja; (middle) Charge&GO; (middle left) MT-KOMEX; (bottom) ABB

SOLARPOWER EUROPE LAUNCHES AGRISOLAR POLICY MAP TO GUIDE EU STRATEGY

SolarPower Europe has unveiled its new Agrisolar Policy Map, a comprehensive policy tool designed to benchmark agrisolar regulations across 18 EU Member States. The Map highlights best practices and regulatory gaps, aiming to accelerate the deployment of agrisolar solutions that support both energy and agricultural resilience.

Lina Dubina, Policy Advisor at SolarPower Europe (she/her), said: "The Agrisolar Policy Map is a vital step in unlocking the full potential of agrisolar. By identifying where Member States are leading or lagging, we can better inform EU-level reforms and empower farmers to harvest the sun twice."

The Map assesses six key policy areas: legal definitions, land use and zoning, support schemes, technical requirements, agricultural productivity, and environmental safeguards. It reveals that while some countries, such as France and Czechia, have introduced clear frameworks, others remain fragmented or lack definitions altogether.

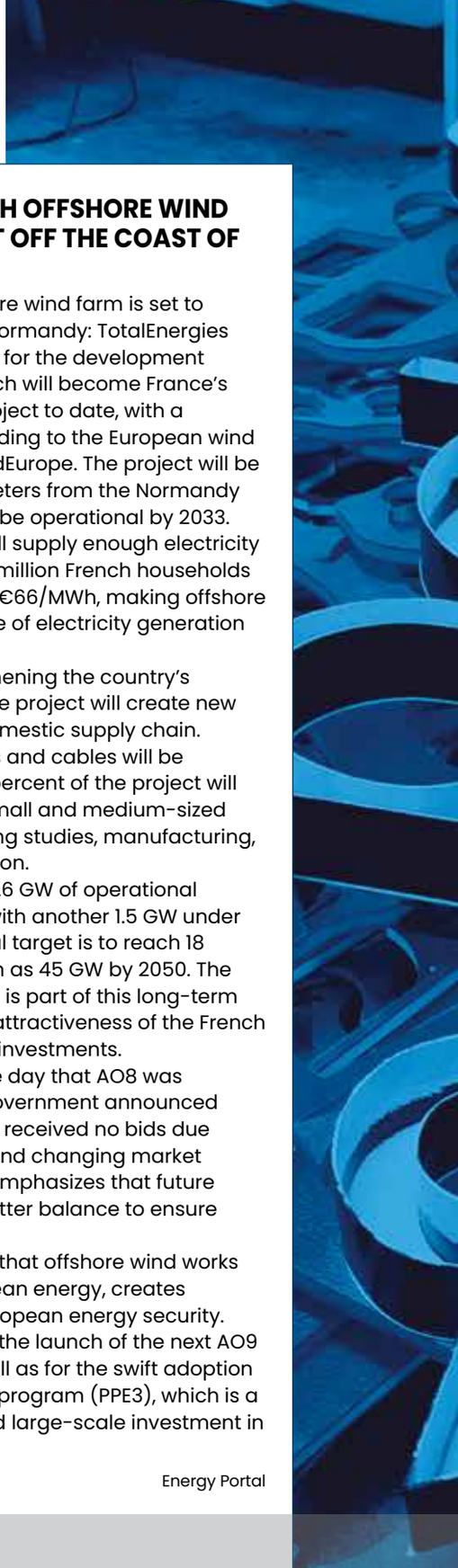
Key Findings:

- Only 5 of 18 Member States have a legal definition for Agri-PV.
- Environmental Impact Assessment (EIA) requirements for agrisolar vary widely.
- Support schemes and Common Agricultural Policy (CAP) eligibility remain inconsistent, limiting farmer access to funding.

SolarPower Europe calls on EU policymakers to harmonize agrisolar regulations and provide clear guidance under the CAP.

The Agrisolar Policy Map was presented at the Agrivoltaics Industry Forum in Milan on 21–22 October. The launch follows the European Commission's recent recognition of solar PV in its 'Vision for Agriculture and Food' strategy, and the European Parliament report, which also officially recognized the role of Agri-PV.

SolarPower Europe



THE LARGEST FRENCH OFFSHORE WIND FARM IS BEING BUILT OFF THE COAST OF NORMANDY

The largest French offshore wind farm is set to be built off the coast of Normandy: TotalEnergies has won the AO8 auction for the development of Centre-Manche 2, which will become France's biggest offshore wind project to date, with a capacity of 1.5 GW, according to the European wind industry association WindEurope. The project will be located around 40 kilometers from the Normandy coast and is expected to be operational by 2033.

The new wind farm will supply enough electricity to power more than one million French households at a competitive price of €66/MWh, making offshore wind the cheapest source of electricity generation in France.

In addition to strengthening the country's energy independence, the project will create new jobs and reinforce the domestic supply chain. European-made turbines and cables will be utilized, while at least 10 percent of the project will be carried out through small and medium-sized enterprises, encompassing studies, manufacturing, construction, and operation.

France currently has 1.6 GW of operational offshore wind capacity, with another 1.5 GW under construction. The national target is to reach 18 GW by 2035 and as much as 45 GW by 2050. The Centre-Manche 2 project is part of this long-term strategy, confirming the attractiveness of the French market for offshore wind investments.

However, on the same day that AO8 was completed, the French government announced that the AO7 auction had received no bids due to technical challenges and changing market conditions. WindEurope emphasizes that future auctions must strike a better balance to ensure sustainable investment.

The AO8 results show that offshore wind works for France – it delivers clean energy, creates jobs, and strengthens European energy security. WindEurope is calling for the launch of the next AO9 and AO10 auctions, as well as for the swift adoption of the multi-year energy program (PPE3), which is a prerequisite for continued large-scale investment in the sector.

Energy Portal

Photographs: (left) Unsplash/Mark Merner; (right) Unsplash/Nicholas Doherty

LOW AUCTION BUDGET PUTS UK OFFSHORE WIND AT RISK

The UK Government has announced an initial budget for the next offshore wind auction round (Allocation Round 7, or AR7). The initial proposed budget is £ 900 million for conventional bottom-fixed offshore wind and £ 180 million for floating wind. This would "buy" only 5 – 6 GW of capacity in the auction. The UK currently has 12.5 GW of offshore wind and aims to reach 50 GW by 2030. They have only this auction and the one next year to deliver that. The proposed budget would leave the UK falling well short.

Crucially, with this budget, the UK would miss out on 53 billion pounds in private investment and 45,000 jobs. Every gigawatt of offshore wind brings 2–3 billion pounds to the UK. And they've got the projects ready to deliver these benefits. More than 20 GW of offshore wind is prepared to bid in this auction. However, only around a quarter of those would actually proceed with this budget.

European Commission Proposes Record EU Budget to Boost Competitiveness – But Wind Needs a Dedicated Fund

Planned Construction of the "Samoš" Wind Farm Enters Public Consultation Phase

The initial budget announced for AR7 isn't a fixed amount of money that will definitely be spent. Instead, it sets a maximum limit for how much the government is willing to support through the auction. The actual cost will depend on future electricity prices. For example, in a previous round (AR2), the government set aside £ 290 million, but because electricity prices rose sharply during the energy crisis, the projects actually paid back £ 120 million to consumers.

The government has also set a maximum price it's willing to pay for electricity from these projects: 113 pounds per megawatt-hour for bottom fixed offshore wind and 271 pounds per megawatt-hour for floating wind. These prices reflect the fact that floating wind is a relatively new and more expensive technology.

The UK leads the rest of Europe in offshore wind. An auction with these lower volumes than expected would undermine that leadership. And it would adversely impact the wider UK and European wind energy supply chain, which is counting on significant volumes in AR7.

WindEurope

DRESSES MADE FROM FLOUR SACKS – A LESSON IN RECYCLING

During the Great Depression in the United States, when money for even basic needs was scarce, women showed that functionality and aesthetics could be created even out of limited resources.

At that time, flour sacks were woven from cotton and, instead of being discarded, became raw material for dresses, skirts, shirts, and bedding. There was something profoundly rational about this – a cycle of reuse emerged spontaneously, long before recycling was spoken of as a social or ecological obligation.

Companies quickly recognized this trend. Instead of rough canvas sacks, they began to use softer cotton, printing floral and geometric patterns onto the fabric. They realized that their packaging was not ending up in waste but in households, becoming part of a broader life story. Even company logos were adapted – printed with plant-based ink that could easily be removed, allowing women to use the fabric without unwanted marks. In this way, marketing and functionality became allies in difficult times.

This episode in history tells a story far beyond mere practicality. It raises the question of the value of materials and our relationship to things. If, in times of scarcity, it was natural for packaging to be turned into clothing, why is it so difficult today, in an age of abundance, to find meaning in reuse?

Dresses made from flour sacks were not a symbol of romanticized poverty but a testimony to rational and sustainable thinking. Today, in an era of excess and short-lived products, these examples serve as valuable lessons. Recycling is not a new idea – it has always been a part of our lives; once it was a necessity, today it should be a conscious choice.

Instruction manuals on how to sew clothes from sacks can still be found online. This may sound like a curious oddity, but in fact, it is a valuable reminder that innovation and sustainability go hand in hand.

Therefore, let this article also serve as a reminder that materials always hold value, and that value does not disappear with their first use.

Milena Maglovski

Photographs: (left) Unsplash/Sander Weeteling; (right) Unsplash/Amy Humphries

RESET PROJECT RESULTS: EDUCATION AND SKILLS FOR THE RENEWABLE ENERGY FUTURE OF THE WESTERN BALKANS (2023–2025)

Did you know that in the Western Balkans, carbon intensity is more than five times higher than in the EU, and that most households still rely on coal, oil, or even traditional firewood for heating? This dependence not only makes the region one of the most carbon-intensive in Europe, but also increases vulnerability to energy poverty, health risks, and economic instability. To tackle this, the Green Agenda for the Western Balkans, launched in 2020, set a clear direction: cut CO_2 emissions, reduce fossil fuel dependence, and move towards renewable energy. But there is a catch – without skilled workers and modern education systems, this transition cannot succeed.

This is where the RESET – Renewable Energy Services in Education and Training project comes in. Implemented by the Education Reform Initiative of South Eastern Europe (ERI SEE), with the support of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) under the Regional Climate Partnership framework, RESET served as the education and skills dimension of the broader regional project Green Agenda: Decarbonization of the Electricity Sector in the Western Balkans.

While the Green Agenda for WB set the overall direction and long-term goals of the energy transition, the RESET project focused on making these ambitions tangible in the vocational education and training sector. By developing teaching materials, strengthening vocational education and training (VET) systems, and supporting schools, teachers, and learners, the RESET project helped ensure that the transition to renewable energy is not only about new technologies and infrastructure, but also about people and the skills that will shape the region's energy future.

Teaching and Learning Materials (TLM): For the first time, regional teaching and learning resources were developed for two critical areas in the renewable energy sector: Installation and Maintenance of Solar Photovoltaic Systems and Installation and Maintenance of Electrical Equipment in Wind Power Plants. These practical and modern guides, with numerous videos, exercises, and examples, published in Montenegrin, Albanian, Macedonian, and Serbian, are now available to vocational schools and adult education centers across the region. Teaching and learning materials are available for download on the following link.

Action Plan: In 2025, RESET coordinated the development of the Regional Action Plan for Supporting Education and Training in the Renewable Energy Sector. This strategic document provides ministries, agencies, and other relevant bodies with a roadmap to align their activities with the labor market needs in the renewable energy sector, ensuring they can support the energy transition.

Awareness and outreach at regional and national levels: Through two regional EduEnergy conferences, 12 national events, and a targeted media campaign, RESET brought together educators, businesses, policymakers, and the wider public, showing that renewable energy careers are not only necessary but also attractive, gender and socially inclusive, and future-oriented.

The next step is to build on the foundation laid. This means staying connected across the region, encouraging stronger partnerships between schools, businesses, and governments, ensuring that funding continues to support green education, and maintaining an inclusive transition so that no one is left behind.

With these steps, the Western Balkans can move more quickly towards a clean, competitive, and fair energy future, and everyone has a role to play in that journey.

ERI SEE

Photograph: Unsplash/Markus Spiske

NEW DATA REVEAL THE EXTENT OF EUROPE'S E-WASTE CRISIS, NGOS CALL FOR URGENT ACTION

New Eurostat data released today exposes the scale of Europe's overconsumption of electronics and the continued failure to collect and recycle e-waste properly.

Environmental NGOs are urging the European Commission to take decisive action in the upcoming revision of the Waste of Electric and Electronic Equipment (WEEE) legislation. Notably, they call for stronger and binding measures to prevent waste and promote repair, reuse, and proper collection, including reuse targets, and robust EPR schemes with eco-modulated fees that hold producers accountable for their products throughout their life cycle.

Eurostat's latest data confirm a worrying trend: more electronics are entering the EU market, and as a result, more e-waste is generated. In 2023:

- More than 14.4 million tons of electrical and electronic equipment were sold in the EU – an increase of over 89 percent since 2012.
- The highest per-capita consumers of electrical and electronic equipment in the EU were the Netherlands, Germany, Austria, France, and Italy, with consumption levels ranging from 33.3 to 45.4 kilograms per person.
- 5.2 million tons of e-waste were collected – just 4.4 percent more than in 2022.
- Collection rates are still alarmingly low across the EU, including, for example, in Germany, where only 29.5 percent of e-waste is collected and reported correctly.
- The lowest e-waste collection rates were recorded in Cyprus, Malta, Portugal, the Netherlands, and Hungary.

The rising consumption of electronic devices is depleting finite resources, such as lithium, palladium, and copper, while increasing energy demand and inflicting harm on human health and the environment during the extraction of raw materials. The problem is made worse when products have a short lifespan, are difficult to repair, or are improperly disposed of. These challenges are still common in Europe, where the average phone is replaced every 3 years and the average collection rate for WEEE remains at 37.5 percent.

To address these challenges, environmental NGOs are calling for ambitious and harmonized Extended Producer Responsibility (EPR) systems that prioritize prevention, reuse, and repair.

EEB

EVERY ELEVENTH PERSON GOES HUNGRY WHILE BILLIONS OF TONS OF FOOD END UP AS WASTE

In a world where one in eleven people goes hungry, more than 2.3 billion tons of food are lost or wasted every year, the United Nations warns on the occasion of the International Day of Awareness of Food Loss and Waste, marked on September 29.

According to data from the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Program (UNEP), approximately 13 percent of food – equivalent to 1.25 billion tons – is lost between harvest and retail. In comparison, an additional 19 percent (1.05 billion tons) is wasted in households, restaurants, and shops. Households alone generate approximately 60 percent of global food waste.

This problem not only undermines global food security but also significantly contributes to climate change, as 8 to 10 percent of total greenhouse gas emissions stem from lost or wasted food.

– Our food systems cannot be resilient if they are not sustainable. When we waste food, we also waste water, land, energy, and labor invested in its production – a point emphasized by the United Nations (UN).

The UN reminds that reducing food loss and waste is part of Sustainable Development Goal 12, which aims to halve global per capita food waste at the retail and consumer levels and reduce losses along production and supply chains by 2030.

With the world's population projected to reach 9.7 billion by 2050, the fight against food waste is becoming a matter of survival. Experts suggest that introducing new technologies, digital platforms, circular economy models, and innovative food processing solutions could create new job opportunities, enhance sustainability, and contribute to a healthier future.

As every September 29 reminds us, the message is clear: everyone – from producers to consumers – has a role in building a world without hunger and food waste.

Milena Maglovski

Photographs: (left) Unsplash/John Cameron; (right) Unsplash/Memories On

UPCYCLED FOOD – HOW FOOD WASTE BECOMES A NUTRITIONAL RESOURCE

A portion of food that never makes it to the plate has a much greater impact than it might seem at first glance. Every bite we throw away contributes to methane emissions – a gas with roughly 28 times the global warming potential of carbon dioxide. Consequently, food waste significantly contributes to global warming. Specifically, about eight percent of human-induced greenhouse gas emissions come from food loss and waste, according to Project Drawdown.

The idea of reusing food scraps is not new. For centuries, people have produced compost and natural fertilizers, replenishing the soil with essential nutrients. However, the concept of upcycled food is more recent and introduces a different approach. Instead of using food waste to enrich soil with nutrients, it is recycled into new, nutritious products intended for human consumption. Additionally, recycled ingredients can also be used in animal feed, pet food, cosmetics, home care products, and much more.

This concept combines innovation, technology, and ecology. Ingredients used include:

- Fruit and vegetable peels
- Pulp and leftovers from juice production
- Seeds and pits
- Stale bread
- Yeast and grain residues
- Nut shells and other by-products from the food industry

Upcycled Food Association

The Upcycled Food Association (UFA) is an organization that promotes upcycling as one of the most important solutions to mitigate the climate crisis. Their role is to coordinate hundreds of companies worldwide to prevent food waste and empower consumers to make a difference with their purchasing decisions.

Food produced in this way can sometimes raise skepticism among the public due to its production method. That's why UFA also focuses on educating and empowering millions of consumers worldwide to choose such products. As a guarantee of quality, the association issues Upcycled Certified certificates – the only globally recognized third-party certification for upcycled foods.

- The certificate confirms that the product uses food scraps that would otherwise be discarded, while being nutritionally valuable and safe for consumption.
- It also ensures that the supply chain and production process meet the defined standards for upcycled food.
- The label allows consumers to identify products that genuinely contribute to reducing food waste.

The goal is for these certified products to become attractive to consumers – products that bring value not only to them but also to the environment.

While billions of tons of food end up as waste, millions of people still go hungry, and climate change threatens to make this injustice even worse. Upcycled food is a way to simultaneously reduce greenhouse gas emissions and help provide food for those who need it most.

Katarina Vuinac

Photograph: Pixabay/Ben Kerckx

254402

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SOLAR POWER IS THE FUTURE – BUT ONLY IF IT'S SAFE

Zarja Elektronika and Protectowire Lead Regional Efforts in PV Fire Safety

Solar power stands as a symbol of clean energy and sustainable progress. However, in the event of a fire, this green story can turn into an environmental threat — with chemical emissions, toxic gases, and major material losses. Only comprehensive fire protection can ensure that photovoltaic (PV) systems remain truly sustainable solutions in the energy transition.

In this field, **Zarja Elektronika** plays a pioneering role in the region. With over **40 years of experience in fire detection and alarm systems**, and as the only company in Southeastern Europe with **its own in-house development and production of fire control panels**, Zarja is recognized as a *knowledge-based company* — a regional hub for expertise and practical solutions in industrial fire protection.

Photographs: Zarja Elektronika

Science in Practice – Logatec Live Test

On **August 27, 2025**, Zarja Elektronika, in cooperation with the **Slovenian National Building and Civil Engineering Institute (ZAG)** and **Protectowire FireSystems**, conducted a unique full-scale test in the **ZAG Fire Laboratory in Logatec**.

A real rooftop PV setup was used to simulate typical fire scenarios caused by **electrical arcing** and **combustible materials beneath the modules**. The **CTI Linear Heat Detectors (LHD)** responded within **20 to 30 seconds**, significantly earlier than visible fire cues, demonstrating how early detection can prevent escalation and major losses.

Professor Grunde Jomaas, Head of the Department for Fire-Safe Sustainable Built Environment (FRISSBE) at ZAG, emphasized:

"Reliable early detection can significantly reduce the consequences of fires on roofs with PV installations. Our tests show that detection is not only about triggering an alarm but about enabling timely and effective response before the fire spreads."

Brooke Fishback from **Protectowire FireSystems** presented the **CTI (Confirmed Temperature Initiation)** technology, explaining how it confirms thermal activation before triggering the alarm, minimizing false alarms and ensuring accurate detection under real conditions.

In addition to the experimental work, **ZAG has also published a comprehensive PV Fire Safety Guideline**, available in **English, Croatian, and Slovene**, which highlights the importance of early detection and safe design principles for rooftop PV systems.

Belgrade – Technical Presentation on PV Fire Safety

Just a few days later, on **September 2, 2025**, Zarja Elektronika organized a **professional presentation and discussion on PV fire safety** in **Belgrade**, together with partners **Protectowire** and **BS PROJEKT 2009**.

The event gathered engineers, designers, investors, and fire safety professionals. The results of the Logatec Live Test were presented, along with practical examples and design recommendations for early detection systems.

A short survey among participants showed that **one-third already had practical experience with PV fire incidents**, while the majority were addressing this topic for the first time. Most companies still rely only on basic protection, which highlights the need for modern fire detection technologies.

Siniša Teodosić, Director of **BS PROJEKT 2009**, noted:

"Protecting PV systems on commercial buildings is now a priority. Together with Zarja and Protectowire, we can offer investors proven solutions that comply with European standards and real test data."

Representatives of **Stop Shop**, **Perović Midrag** and **Aleksandar Ranisavljević**, who attended the Logatec Live Test, added:

"For investors, it is essential to see that solutions are not just theoretical — seeing them tested under real fire conditions gives us the confidence to implement them in our projects."

From Research to Real Guidelines

The knowledge gained from both events has been compiled into the document **"Recommendations for the Design of Fire Detection and Alarm Systems in Rooftop PV Installations"** – the **first regional guide specifically intended for electrical designers, system engineers, investors, and supervisory authorities** involved in PV fire safety planning.

These recommendations provide **practical design and installation instructions** for the use of **linear heat detection systems (LHD/CTI LHD)**, covering component selection, layout planning, connection schemes, and integration with fire alarm control panels and shutdown units. The document follows European and Slovenian standards (such as *EN 54-14*, *EN 54-5*, and *EN 12094-1*) and supports consistent and safe implementation of detection systems in rooftop PV projects.

Together with ZAG's **PV Fire Safety Guideline**, these recommendations send a unified message:

Early fire detection in PV systems is essential not only for asset protection but also for the sustainable and safe operation of solar energy infrastructure.

Zarja Elektronika

NATIONAL PARK CITIES – A VISION OF HEALTHIER AND GREENER URBAN ENVIRONMENTS

In modern cities, it is somewhat utopian to expect complete harmony with nature. Urban and social life have distanced people from their cultural heritage, while nature in many areas has been depleted and now requires support to regain its balance. In an era of health, climate, and environmental challenges, the concept of National Park Cities (NPC) offers a vision of urban environments that are greener and healthier. Although they are not traditional national parks, these cities draw inspiration from their values and guiding principles.

The Origin of the National Park City Concept

The idea of the National Park City was first proposed in 2013 by Daniel Raven-Ellison, a geographer and National Geographic explorer. After visiting several national parks across the United Kingdom, Raven-Ellison began to imagine how London could be transformed into a city that functions as a national park.

He launched an initiative called the National Park City Foundation, which was formally registered in 2017 as an independent charitable organization funded through grants and donations.

Through this initiative, London enhanced its green spaces, protected local plant and animal species, and encouraged citizens to participate in preserving nature and cultural heritage. Particular attention was given to promoting sustainable mobility, such as walking and cycling, as well as educating communities about the importance of green areas.

After several years of campaigning led by Raven-Ellison and supported by collaborators, London was officially declared the world's first National Park City in 2019.

This success served as an inspiration for a broader initiative. The experience of experts from more than 50 countries contributed to shaping the Universal Charter for National Park Cities, which emphasizes improving human health and wellbeing, preserving biodiversity, protecting habitats and public spaces, encouraging outdoor life, culture, art, play, walking, and cycling, as well as supporting local food production and responsible consumption. It particularly highlights the importance of shared decision-making, learning, and acting in harmony with nature and human relationships.

Through an initiative called the National Park City Foundation, London enhanced its green spaces, protected local plant and animal species, and encouraged citizens to participate in preserving nature and cultural heritage

Photograph: Unsplash/Simon Hurry

The National Park City Foundation Today

Today, the Foundation provides support, coordinates the global vision, launches campaigns, establishes partnerships, and offers advisory services to cities. The National Park City model functions from the bottom up — driven by citizens, organizations, and local authorities who wish to make their city greener, healthier, and fairer.

A city begins its candidacy by signing the charter, developing its vision and plan, and demonstrating broad community support. The Foundation then provides guidance and mentorship, and after evaluating the city's activities, grants official status. Once recognized, the city becomes part of the global National Park Cities network and is obliged to continuously improve the quality of life and strengthen the connection between people and nature.

The Foundation has set a goal for at least 25 cities to gain National Park City status by 2025. Although this goal has not yet been fully achieved, in addition to London, three other cities have received this status, with several more currently in the application process.

Examples of National Park Cities

Adelaide was declared a National Park City in December 2021 — the first in Australia and the entire Southern Hemisphere, and the second in the world to receive this recognition. The whole process was initiated and led by Green Adelaide, the organization responsible for managing the natural environment of the metropolitan area.

Over the next three years, the city worked on improving urban greenery and biodiversity protection, including: strengthening tree protection and designing green spaces through the Urban Greening Strategy; preserving and gradually phasing out single-use plastics; and restoring coastal habitats. The Government of South Australia has also developed new Biodiversity Legislation to protect local species and ecosystems better, and established the First Nations Voice in Parliament to ensure that Indigenous communities have direct participation in decision-making.

Breda became the first National Park City in the European Union in 2025. The city aims to become an "urban area within a natural park," with the active participation of its citizens. It has set the goal of becoming one of Europe's greenest cities by 2030, supported by municipal urban planning policies. Breda has long been developing greening projects — about 60 percent of its area consists of green spaces, small forests, walking and cycling paths, canals, and community food production initiatives.

One successful example is the Green Quays project, which revitalizes the River Mark and transforms its banks into green spaces, reintroducing nature to the city's medieval core. Breda also strives for CO_2 neutrality by 2044, supporting citizens through subsidies for green roofs, façades, rainwater systems, and courtyard greening.

Photograph: Unsplash/Frans Koning

Chattanooga became the first National Park City in North America in 2025, setting seven key goals: facilitating access to nature, promoting outdoor activities, protecting and educating about the environment, fostering inclusive and sustainable development, strengthening community and culture, supporting local food and agriculture, and advancing art and creativity.

Over the years, the city has transformed from an industrial center into a place deeply connected with nature, through active citizen engagement and strong local government support. Biodiversity preservation and the enhancement of urban greenery are evident in projects such as the restoration of Montague Park and River, clean water initiatives, and animal conservation programs at the Tennessee Aquarium Conservation Institute and the Hellbender Research Lab at the local zoo. This success is rooted in collaboration among diverse stakeholders.

In addition to these cities that have already achieved National Park City status, several others — including Rotterdam, Cardiff, and Glasgow — have been nominated and are currently in the process of applying for this designation.

Recommendations and Criteria for Cities

For cities aspiring to become National Park Cities, the Foundation has defined ten key steps based on London's experience. By following these recommendations, a city can prepare to submit its official application.

The first step involves familiarizing oneself with the values and objectives of the National Park City (NPC) initiative. Next comes the registration of the campaign, followed by an exploration of potential—gathering community support, engaging citizens, and collecting evidence. At the same time, it is important to create a narrative for the city that shapes how people experience nature within the urban environment.

Following this, cities develop proposals and a National Park City Charter, which help define ideas and gain public and governmental support. The subsequent steps include building a community network, clearly communicating goals, and ensuring adequate capacity for project implementation. Then, a portfolio application is submitted, describing how the city will meet the 23 criteria required to achieve National Park City status. Finally, the city must fulfill its obligations as a member; once the application is approved, it can plan the confirmation and celebration of its new status.

To become a National Park City, an urban area must meet a range of criteria assessing its suitability, the visionary and inclusive nature of the initiative, as well as the level of public support and its ability to fulfill the NPC goals.

Regarding suitability, consideration is given to whether the city meets the *OECD* definition (a population of at least 50,000) or is officially recognized as a city, and whether there are significant projects, landmarks, and achievements that the community takes pride in and wishes to showcase.

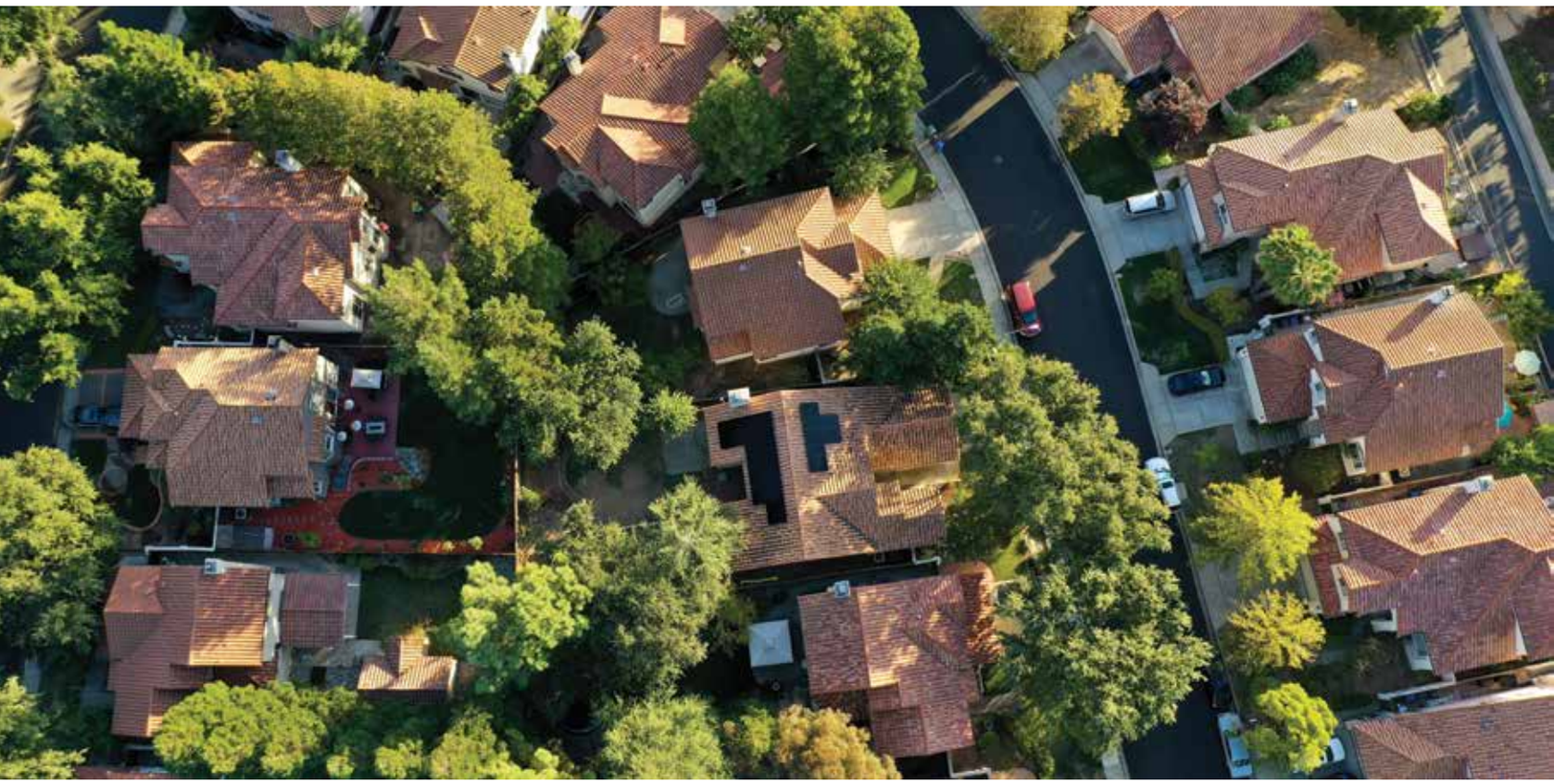
The initiative must represent a place, vision, and community striving to become greener, healthier, and wilder. It must benefit everyone through active participation and support from people across different parts of the city and beyond. Political backing is also essential—policies that protect and enhance nature, culture, heritage, the environment, and public space, as well as those that promote the values of National Park Cities.

In addition, it is necessary to establish an organization, network, or other governing structure for the National Park City and to commit to regular progress monitoring, including the publication of an annual State of the National Park City report. These are just a few of the criteria a city must meet to obtain and maintain its National Park City status.

The National Park City concept demonstrates that urban life and nature can coexist in harmonious balance. The NPC initiative allows cities to gradually improve green spaces, biodiversity, and the quality of life for their citizens through active community engagement and the support of local authorities. In doing so, it builds a long-term vision of sustainable and healthy urban environments.

Prepared by Katarina Vuinac

Photograph: Pixabay



GREEN CONSTRUCTION IN BOSNIA AND HERZEGOVINA – OBSTACLES ON THE PATH TO SUSTAINABILITY

The Green Building Council – Green Council BiH association brings together experts from various fields to promote best practices in sustainable and responsible construction through an interdisciplinary approach. They have produced a substantial number of scientific and professional publications, as well as workshops, lectures, conferences, and advocacy initiatives. The organization pays special attention to young people through the organization of summer schools and practical workshops that help raise awareness about the importance of sustainable development. The association has received the highest award, the EU New European Bauhaus, for the best European project in the field of sustainable construction and development. With a partnership agreement signed with the German Sustainable Building Council (DGNB), they plan to continue their certification projects and promote

Green building certification involves the engagement of a qualified, accredited certifier from the very beginning of the planning and development stage

Photograph: Pixabay/hamlinjandrew

sustainable and responsible building even more actively and conscientiously. We spoke with Sanela Klarić, an advisor to the Association, about their educational programmes and green certification processes.

Q: What are the biggest obstacles in the process of green building certification?

A: Our experience shows that the greatest obstacles in the process of green building certification primarily stem from a lack of awareness about the advantages of this approach. Citizens, designers, construction companies, and investors are still not sufficiently familiar with the benefits of green certification, which often leads to a lack of support from the outset. Another challenge lies in the absence of clear strategies and legal frameworks that would systemically support such processes, as well as in the lack of completed examples within the country and the region that could serve as models and demonstrate that these projects can be both successful and cost-effective. Furthermore, professional capacities – from designers and contractors to certifiers – are still underdeveloped, which hinders the wider adoption and effective implementation of green certification standards.

Q: How does green housing certification work in practice?

A: Green building certification involves the engagement of a qualified, accredited certifier from the very beginning of the planning and development stage. Their role is not merely formal but also advisory and educational: they guide the design team, investors, and contractors throughout the entire process, from the initial concept to final completion. The certifier helps maximize the site's potential, introduces principles of sustainable resource management, advises on responsible site management and waste handling, and monitors the life-cycle assessment of materials, components, and the building itself. Particular attention is given to the efficient use of water and renewable energy sources, the use of natural and locally sourced materials, as well as compliance with health standards that include testing water and indoor air quality, and verifying the effectiveness of energy efficiency measures. Safety standards, such as fire protection and inclusive access to buildings, are also an integral part of the process.

Unlike traditional construction methods, green certification is more complex and demands greater responsibility, interdisciplinary collaboration, and continuous monitoring. Nevertheless, the benefits it brings far outweigh the initial effort. The result is higher-quality buildings designed with both people and the environment in mind, offering greater comfort, protecting users' health, reducing negative environmental impacts, and saving energy, water, and other resources in the long term. Such buildings represent an investment not only in a sustainable future but also in the safety and quality of life of present and future generations.

Unlike traditional construction methods, green certification is more complex and demands greater responsibility, interdisciplinary collaboration, and continuous monitoring. Nevertheless, the benefits it brings far outweigh the initial effort

Q: Do you have data on reduced energy consumption or emissions for the projects you have supported?

A: For buildings currently in the pre-certification and certification phase, data must be collected over twelve months, after which the results can be verified and officially

Photographs: Green Council BiH

presented. Alongside this, user education is being conducted to encourage responsible behavior and the implementation of green certification measures in daily life. Even now, although the process is still ongoing, significant savings and increased user satisfaction are clearly noticeable. However, until the data collection period is completed, these results cannot be officially confirmed or shared with the public. The experience of our colleagues from the DGNB (German Sustainable Building Council), with whom we have signed a partnership agreement, further encourages us, as their professional insights provide important validation of our findings and demonstrate that we are moving in the right direction.

Q: What is the impact on users' health in buildings with biomaterials or improved ventilation?

A: It is a widely accepted scientific fact that high levels of air pollution pose a serious threat to human health. However, indoor air pollution, which occurs in spaces where we spend most of our lives, represents a particular danger, as the concentration of harmful substances is often significantly higher than in outdoor environments. Research increasingly shows that such pollution not only leads to health consequences but also results in major economic losses, especially in less developed and developing societies.

According to data from the World Health Organization, nine out of ten people worldwide breathe air containing concentrations of pollutants that exceed recommended limits. Harmful substances enter indoor spaces from both the external environment and the materials used inside, such as flooring, wall coverings, furniture, or technical equipment. Their presence is further aggravated by the lack of modern ventilation and air recovery systems, which allows pollutants to linger and affect people through

inhalation, ingestion, or skin contact. The consequences are manifold: from respiratory problems and worsening asthma to cardiovascular diseases and cancer, as well as reduced concentration, attention, and academic performance. These symptoms and illnesses caused by poor indoor air quality are already recognised and clearly defined in WHO guidelines and recommendations, as well as in relevant European Union directives.

Improving indoor air quality requires an integrated approach that encompasses the construction, renovation, adaptation, and maintenance of buildings. This includes careful site selection, the use of natural and non-toxic materials in construction and interior design, greening indoor and outdoor areas with air-purifying plants, and planning sustainable systems for heating, cooling, ventilation, and filtration. Equally important are sustainable cleaning methods that utilize non-toxic products, the use of non-hazardous equipment, and continuous air quality monitoring in accordance with clearly defined protocols. Educating users and raising awareness about the importance of indoor air quality are key elements of this process. Ultimately, optimal and consistently planned ventilation or air recovery, combined with a careful selection of materials, plays a vital role in reducing pollutant concentrations and protecting human health.

Q: What technological barriers still need to be overcome for sustainable architecture to become the standard?

A: Sustainable architecture is becoming a global standard, but in Bosnia and Herzegovina, there are still numerous challenges slowing down its broader adoption. One of the main problems is limited access to high-quality ecological materials. Modern insulation materials, as well as natural, environmentally friendly, low-carbon, and recycled building materials, are often more expensive or more complicated to obtain, which increases construction costs.

Another obstacle is the lack of technological knowledge and equipment. Low-carbon green building systems, renewable energy sources, and smart technologies require skilled professionals and specialized equipment. Yet, many contractors in Bosnia and Herzegovina still lack experience in their application, as well as the necessary human and technological capacities.

Photographs: (top) Pixabay/Nikguy; (bellow) Green Council BiH

Q: What do you think would be the most effective concrete steps in Bosnia and Herzegovina?

A: Education is the foundation for building capacity in planning, design, construction, monitoring, and the more responsible development of the construction sector. Adopting the best standards in planning, design, production, installation, maintenance, and monitoring of a building's life cycle is a key step towards the responsible development of a construction sector tailored to human needs

Adopting the best standards in planning, design, production, installation, maintenance, and monitoring of a building's life cycle is a key step towards the responsible development of a construction sector tailored to human needs

Furthermore, the digitalization of the construction industry and the use of BIM (Building Information Modelling) technology remain rare. BIM enables more precise design and optimization of material and energy use; however, without proper training and software support, sustainable construction projects cannot fully realize their potential. The integration of renewable energy sources into buildings also faces obstacles – a lack of local installers, high technology costs, and an absence of standardised solutions are slowing progress.

Finally, building maintenance and performance monitoring, including adequate performance measurements, present an additional challenge. Sustainable technologies require regular supervision and servicing; yet, there is still a shortage of qualified personnel for long-term monitoring, and such monitoring is not mandatory.

Overcoming these technological barriers is a key step towards making sustainable architecture in Bosnia and Herzegovina the norm rather than the exception, allowing cities and communities to become healthier, more energy-efficient, and more environmentally responsible.

It is also crucial to adopt strategies and legislation in line with the EU Green Deal and the best European practices, ensuring interdisciplinarity and effective cooperation between different sectors and institutions.

Finally, the introduction of green public procurement represents a practical mechanism that further promotes the implementation of sustainable construction practices and sets a standard for responsible investment in the public sector.

Interview by Jasna Dragojević

Photographs: (top) Pixabay/Taras Yasinski; (middle) Green Council BiH; (bottom) Pixabay/Miljan Rašević

ACCELERATING THE ELECTRIFICATION OF TRANSPORT WITH CHARGE&GO

Charge&GO remains committed to its mission — accelerating Serbia's and the region's transition to sustainable mobility through expanding its charging network and developing modern infrastructure.

In October this year, a new 120 kW ultra-fast charger was commissioned at the Riva Shopping Center in Velika Plana, a highly frequented location situated near the highway.

"We are witnessing a constant increase in the number of electric vehicles traveling along this corridor, which undoubtedly deserves additional ultra-fast chargers," said Tamara Zjačić, Deputy Director of Charge&GO.

According to her, plans for the coming year include the installation of at least 15 new ultra-fast DC chargers — with capacities of 120 kW, 150 kW, 180 kW, and 240 kW — across Serbia.

"Contracts have already been signed, the documentation is being prepared, and we expect construction works to begin within the next month to a month and a half," Zjačić added.

Fast Chargers in North Macedonia

The electric vehicle market in North Macedonia is still in its early stages, but shows a clear upward trend. Around 300 electric cars are currently registered in the country, while the number of publicly available chargers still does not exceed a few dozen—mostly slower AC devices. For this reason, the main challenge remains developing a fast and reliable charging infrastructure that enables drivers to travel more safely and conveniently.

An additional boost comes from the private sector, including companies such as Charge&GO, which are investing in the construction of a modern network of DC fast chargers.

"Since September, the first 50 kW charger in North Macedonia has been operational, installed at the Oktin gas station in Ržaničino. It is a public charger that users can activate via the Charge&GO mobile app—the same one used in Serbia," explained Tamara Zjačić, Deputy Director of Charge&GO.

She added that users can, through the unified app, easily access chargers not only in Serbia and North Macedonia but also within the networks of partner operators across Europe.

By the beginning of next summer, Charge&GO plans to install at least seven additional 150 kW fast chargers along the main highways in North Macedonia.

"In the coming period, we will focus on expanding our network and promoting each new charger we put into operation. Our users will be regularly informed about all updates through the app and social media," announced the Deputy Director of Charge&GO.

Prepared by Milena Maglovski

Photograph: Charge&GO

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MT-KOMEX AND MT-KOMEX BH ARE PARTICIPATING IN THE REGIONAL FAIR IN ZAGREB

The companies MT-KOMEX and MT-KOMEX BH will participate in the largest regional renewable energy fair, the Green Energy Fair, to be held on October 29 and 30 at Arena Zagreb.

The fair will bring together leading global manufacturers and companies from Slovenia, Croatia, Serbia, Bosnia and Herzegovina, Montenegro, and Hungary, offering insights into the latest technologies and solutions in solar energy, battery systems, and energy efficiency. The event's importance is further underscored by the presence of all key global brands, which together account for over 90 percent of the world's solar and battery systems market.

At the company's stand, the MT-KOMEX expert team will provide visitors with comprehensive information about planning, design, equipment supply, system implementation, testing, service, and maintenance of solar facilities.

For more than a decade, MT-KOMEX has been actively contributing to the development of the energy sector in the region. Since 2011, the company has

Collaborating with leading global manufacturers of solar equipment, MT-KOMEX ensures top standards of quality, safety, and long-term reliability in its projects

Photographs: MT-KOMEX

focused on energy transition through the realization of solar power plant projects of various capacities. Collaborating with leading global manufacturers of solar equipment, MT-KOMEX ensures top standards of quality, safety, and long-term reliability in its projects.

Today, MT-KOMEX is recognized as a reliable partner in developing sustainable energy solutions, and its participation in the Green Energy Fair will be an opportunity to showcase new technologies, exchange expertise, and strengthen partnerships across the region.

The ZG Green Energy Fair consists of both exhibition and conference programs, with a strong emphasis on the B2B segment and business networking among companies and professionals from the region. Alongside the business section, which includes exhibition stands of leading global companies and a conference program addressing key industry topics, special emphasis is placed on education.

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In collaboration with the EESTEC student organization, a hackathon will be held, while the FS Alpe Adria and MUZZA associations will organize workshops and STEM activities for children. A particularly attractive feature of the event will be student-built formula cars, showcasing innovative solutions in the field of e-mobility.

In this way, the Green Energy Fair connects industry, academia, and the public, helping to prepare the ground for future generations of energy experts.

Fair Information

Admission to the event is free, with mandatory registration at www.zg-gef.com. The organizers invite industry professionals, researchers, and the general public—including families—to take advantage of the opportunity to be part of the largest regional showcase of green energy and e-mobility. At the same time, companies are encouraged to participate through exhibitions and sponsorships, actively contributing to shaping the energy future of Southeast Europe.

The main topics of the conference program include: grid flexibility and digitalization, battery and hybrid systems, innovations in photovoltaic modules and inverters, e-mobility and V2G technology, green hydrogen production and use, energy efficiency, project financing options, legal frameworks, and international cooperation.

As previously mentioned, the fair will take place at the Arena Zagreb, located on Vice Vukova Street, a modern and spacious venue recognized as Croatia's leading multifunctional hall. The fair will be open both days from 9 a.m. to 7 p.m.

The organizer of the event is Ale-Do TECH d.o.o., a company specializing in renewable energy sources and e-mobility.

Prepared by Jasna Dragojević

MT-KOMEX BUILDING A SOLAR POWER PLANT IN NOVI BEČEJ

The company MT-KOMEX continues to expand its network of solar projects across Serbia — this time in Novi Bečej, where construction has begun on the B4M Solutions solar power plant for the investor B2 Solar Masters d.o.o.

The power plant, located on an 8-hectare site, will have a total installed capacity of 6.7 MWp and a connection capacity of 5 MW, with an expected annual generation of 8,703.5 MWh. Currently, substructure installation is in progress, and project completion is scheduled for early next year.

This solar power plant, designed to deliver full electricity to the distribution system, represents another successful example of a project contributing to Serbia's energy transition and decarbonization goals.

Across the 8-hectare site, a total of 10,368 photovoltaic panels — each with a capacity of 650 Wp from the renowned manufacturer AIKO Solar — will be installed. Power conversion from DC to AC will be handled by 18 Huawei inverters, model SUN2000-330KTL-H1, each with a nominal capacity of 330 kW. The system will also include a 20/0.8 kV transformer station and a range of components ensuring safe and efficient plant operation.

Thanks to the favorable solar potential of the Novi Bečej municipality, where annual solar irradiation ranges between 1,400 and 1,500 kWh/m², the plant is expected to achieve excellent results in clean energy production.

The Novi Bečej project once again confirms MT-KOMEX's dedication to developing sustainable energy solutions and supporting investors on their path toward energy independence and a greener future for Serbia.

Prepared by Milena Maglovski

Photograph: MT-KOMEX

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installed solar panels

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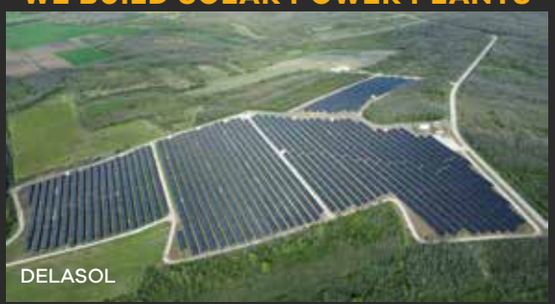

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CLIMATE-RESILIENT CITIES THROUGH SUSTAINABLE ARCHITECTURE AND GREEN INFRASTRUCTURE

Photograph: Unsplash/Dimitrije Milenković

Climate change is increasingly shaping life in cities — from heat waves and floods to pressure on infrastructure and public health. The question of how to make urban environments more resilient has become one of the key issues in contemporary planning and development.

How vulnerable are urban areas in Serbia to climate change, and what role do sustainable architecture and green infrastructure play in adapting to these challenges? These were the topics of our conversation with Ana Šabanović, research associate and PhD candidate at the Faculty of Architecture, University of Belgrade.

Q: Which climate changes most affect urban areas in Serbia, and what impact do they have on everyday city life?
A: The most significant consequences of altered climatic conditions affecting urban areas in Serbia have been identified as an increase in average temperatures and in the frequency and intensity of heat waves, changes in precipitation patterns with a higher occurrence of extreme downpours and seasonal droughts, as well as an increased risk of floods and hydrological extremes. These factors directly affect water resources, urban infrastructure, and public health. Urban areas are particularly vulnerable to the urban heat island effect and to intense rainfall over short periods, which can damage transportation and utility networks, increase the incidence of heat-related health problems, and reduce residents' daily comfort. This results in more frequent disruptions, such as traffic congestion, greater strain on the healthcare system, and economic losses.

Vulnerability assessments for Belgrade indicate that population density, the concentration of critical infrastructure, inadequate drainage systems, and a lack of green spaces further increase the risks to which the population is exposed — especially vulnerable groups such as the elderly and people with chronic illnesses. These challenges point to the need for systemic adaptation measures, which include more resilient infrastructure, sustainable resource management, and the expansion of blue-green areas.

Urban areas are particularly vulnerable to the urban heat island effect and to intense rainfall over short periods, which can damage transportation and utility networks, increase the incidence of heat-related health problems, and reduce residents' daily comfort

Q: When we talk about sustainable architecture and urbanism, how present are such solutions in our country today, and what should the largest cities focus on in the coming years to become more resilient to climate change?
A: In leading literature and global policy documents, green infrastructure is highlighted as one of the most effective solutions for adaptation. In national and local public policies and urban planning documents, sustainable and nature-based solutions have been recognized, but they are mostly formulated at the level of recommendations rather than binding regulations. For example, the General Regulation Plan for the Green Spaces System of Belgrade introduces an ecological index, along with recommendations for installing green roofs, green walls, or tree-lined streets. However, for cities to become more resilient, it is important that these solutions do not remain merely recommendations. Their broader application can be encouraged through incentive measures. Still, the key lies in systemic approaches — ensuring that the ecological index becomes a mandatory urban planning parameter and that elements of green infrastructure are incorporated into regulations for the construction, reconstruction, and maintenance of public infrastructure and public service complexes.

ANA ŠABANOVIĆ is a research associate and PhD candidate at the Faculty of Architecture, University of Belgrade, where she also completed her master's studies in architecture. Her research focuses on sustainable urban development, with particular emphasis on transformative governance as a framework for achieving climate resilience in cities. She actively participates in teaching courses related to sustainable development at the faculty and has presented her research findings at numerous national and international scientific conferences.

Q: Green infrastructure — parks, green roofs, tree lines, façades — is increasingly associated with quality of life. Which of these solutions do you consider particularly important for the largest cities in Serbia, and are they realistically applicable under our conditions?
A: The most important characteristic of green infrastructure is that it

Photograph: courtesy of Ana Šabanović

functions as a network whose elements are interconnected and form a single system, which makes ensuring its spatial continuity crucial.

When considering the importance of individual elements, park and courtyard areas stand out as particularly valuable because tall greenery in direct contact with the ground has the greatest capacity to retain water during intense rainfall, while also providing a more comfortable environment during extreme heat. In this way, the urban heat island effect is significantly mitigated, and microclimatic conditions are improved. Connecting, linear elements — such as tree-lined streets — also play a major role. Research shows that streets with tree lines in Belgrade can be up to six degrees cooler than those without, which is crucial during summer heat waves. Elements of green infrastructure installed on buildings themselves, such as green roofs and façades, are also important. They contribute to the building's energy efficiency and reduce heat gain, thereby influencing the microclimate of the immediate surroundings. At the same time, such solutions reduce pressure on the sewage system by enabling water retention and slower release.

All these elements, individually, have significance and their own functions, but their greatest value lies in their interconnection and integration into a unified, functional system of green infrastructure.

Q: To what extent do local governments, investors, and citizens recognize the importance of sustainable construction and adaptation to climate change? In your opinion, what could accelerate a change in awareness?

A: Awareness of the importance of sustainable construction and adaptation to changing climatic conditions in Serbia exists, but it still does not stand out as a priority. Local levels of government, such as the City of Belgrade, recognize this topic through public policy documents, including the Action Plan for Adaptation to Changing Climatic Conditions with a Vulnerability Assessment (2015), the General Regulation Plan for the Green Spaces System (2019), and the Green Infrastructure Strategy (2024). However, it is evident that insufficient funds are allocated to implement the priority measures outlined in these documents.

Some investors make efforts to introduce elements of green infrastructure and other innovative practices. However, these remain isolated cases, while the majority of projects still focus solely on meeting minimum standards.

As for citizens, awareness exists among a portion of the population, and various civic initiatives and associations are visible, but this has not yet become a general attitude within society. Green spaces and nature-based solutions directly affect air quality, noise reduction, and more favorable microclimatic conditions, and enhance resilience to extreme weather events. In addition to health benefits such as stress reduction and

Photographs: (top) Unsplash/Max Power; (bottom) Unsplash/Maksim Samuilionak

opportunities for recreation, these solutions also promote social cohesion by creating spaces for gathering and interaction.

It is precisely through the dimension of citizens' quality of life that it is easiest to raise awareness that investments in sustainability and adaptation to changing climatic conditions are, in fact, investments in everyday comfort and community well-being. Particularly important is the inclusion of citizens in participatory planning and decision-making processes, since the joint creation of solutions increases the sense of responsibility, encourages care for public spaces, and strengthens trust between the community and institutions.

Q: Do you have an example of good practice from Europe or the region where a city has successfully implemented adaptation to climate challenges? Could you explain what was done particularly well in those cities and what our cities, especially Belgrade, could learn from them?

A: Examples of good practice can be seen in cities such as Berlin, London, and Malmö, where binding urban planning parameters have been introduced to evaluate elements of green infrastructure. Although the methodologies and names differ, what they all have in common is that these standards have become mandatory in planning, which has enabled their consistent and widespread implementation.

Particularly noteworthy is Berlin's Biotope Area Factor, which ensures that every new development contributes to ecological balance through green spaces, roofs, and façades. Belgrade, through its strategic documents, has already recognized a similar instrument, called the Ecological Index, but it has not yet reached the stage of practical application. The greatest lesson from these cities is that recommendations must become binding rules, because only then can green infrastructure become an integral part of urban transformation rather than an exception.

Q: What are the main challenges in Serbia when it comes to implementing such practices – where are the biggest obstacles, and what needs to change to make progress?

A Although Belgrade has recognized the importance of the Ecological Index as a mechanism for evaluating green infrastructure, it has not yet been implemented. The city needs to define specific values, establish a calculation methodology, and ensure that this instrument becomes mandatory, thereby guaranteeing its systematic implementation.

Similar models could be applied in other major cities in Serbia, but only if they become part of obligatory urban planning parameters. In addition to introducing rules, it is crucial to ensure consistent inspection oversight to verify that buildings and plots are constructed in accordance with prescribed standards.

Another challenge lies in maintaining existing solutions, as they are often neglected or removed in practice. It is necessary to clearly define maintenance responsibilities while also encouraging citizens and local communities to take an active role in caring for these areas, so that elements of green infrastructure can continuously contribute to cities' resilience to climate challenges.

Interview by Katarina Vuinac

VELJKO MILKOVIĆ'S INVENTION AMONG THE TOP 10 IN THE WORLD

For centuries, Serbian inventions have found their way to the world stage, leaving a lasting mark on science and technology. That Serbia still has much to be proud of today is confirmed by Veljko Milković, a scientist and innovator from Vojvodina, whose two-stage mechanical oscillator was recently named one of the top 10 inventions in the world at the prestigious iCAN 2025 competition in Canada.

Speaking for Energy Portal, Milković shared that this recognition brings him both great professional and personal satisfaction, as well as validation for all those who have believed in his work over the past decades.

"These were open-minded people, respected professors who reviewed my work without prejudice, recognized that the invention works, and publicly supported me. This award is, in fact, also theirs — a recognition for all intellectuals and individuals who have wholeheartedly stood by me," says Milković. He adds that he does not see his work as a career, but rather as a life mission and responsibility.

"I can't even associate it with a job. It's simply my activity, my duty — if I received information about this invention from somewhere. However, I don't know from where, because that's a mystery, then I have the obligation to develop it and do good with it as much as I can. Fortunately, the impact is being felt around the world, and this award is yet another confirmation that the effort has meaning," concludes Milković.

Photograph: courtesy of Veljko Milković

How the Two-Stage Mechanical Oscillator Works

Our interlocutor explains that this invention is essentially a simple mechanical energy amplifier, a mechanism that "profits" from the force of gravity within the natural gravitational field of the biosphere.

According to him, the two-stage mechanical oscillator technology has great potential and room for further improvement, as it is based on principles that open up new research opportunities. He emphasizes that he is encouraged by the growing public interest and recognition of the invention, as well as by the fact that there are still many curious and open-minded people who want to study and understand it.

Milković also highlights that the fundamental value of the oscillator lies in its ability to operate outside the boundaries of classical mechanics, generating new effects that modern science has yet to explain fully. He believes these phenomena should be approached with an open mind and calm observation, since, as he says, "within them lies a new dimension of understanding mechanical processes."

"The rule with this oscillator," Milković says, "is that there are no rules. What's important to note is that ultra-efficiency has been achieved, and the further improvements I'm working on are beyond current comprehension. The system operates on entirely new principles, precisely in the area where no one expected new discoveries — in mechanics, which was believed to have been concluded 300 years ago with Isaac Newton. People used to say that after Newton, there was nothing new to discover in the field of mechanics. Yet, here we are — there is something new. I'm not claiming, even now, that I've put a final mark on mechanics — certainly not. But while some scholars have believed that the field was long completed, I simply don't share that view," he explains.

The Most Important Practical Applications of the Oscillator

The Serbian inventor explains that the initial application of the two-stage mechanical oscillator was recognized primarily as a water pump, intended for various processes such as irrigation, drainage, purification, and desalination of seawater. Further research revealed that the oscillator has broader industrial applications, especially in piston compressors, where experiments have produced excellent results. This mechanism can also be used in ore crushing and construction material recycling processes, specifically in crushers and grinders for breaking down worn-out construction waste. In addition, research is advancing toward the use of the oscillator as an electric generator, which could open up the possibility of producing electricity in an innovative and energy-efficient way.

70 Years of Creative Work and More Than 120 Inventions

Veljko Milković's long scientific career and unwavering dedication to research have yielded numerous achievements. He points out that he is particularly proud of his invention — the "self-heating ecological house" — which has been proven in practice and has been in use for over thirty years.

"The family of engineer Aleksandar Nikolić has been living in one such innovative solar home near Novi Sad for more than three decades. Engineer Nikolić, who created the construction design and built the house in 1994, has publicly stated on several occasions that he is satisfied with the results and enjoys significant savings on heating and cooling. Based on those savings, he says he can afford free summer and winter vacations for his family, equivalent to what he would have otherwise spent on energy for his home. He's happy, and I'm happy too. I'm glad that the concept has been proven in practice and that he, without anyone's prompting, confirmed it himself," says the inventor.

Milković adds that, in addition to his mechanical oscillator, he is also developing a project titled "Forests for Food Production – A Substitute for Farmland," based on the idea that food can be produced with the help of trees. The concept involves a two-layer system of food production: the first layer consists of fruit-bearing deciduous trees. In contrast, the second layer is activated during winter when the trees lose their leaves. At that time, reflective panels are placed on the ground to create a so-called "two-sun effect." This enables the cultivation of vegetables or small fruits in the lower layer, thereby increasing yields from the same plot of land.

As he explains, plants are grown in pots or boxes to prevent damage to the trees' roots. In contrast, the reflective panels and the microclimate between the trees enable faster plant maturation and a longer photosynthesis season. Milković believes that this approach is an environmentally friendly and efficient response to the growing global demand for food, as it allows a significantly higher yield from relatively small areas of land.

Finally, Milković emphasizes that the path of an inventor is always unpredictable, as ideas cannot be forced; they emerge spontaneously at the right moment. Nevertheless, he stresses that he will continue to refine his existing inventions and work with dedication and a sense of mission, with the hope that his creations will find practical use and contribute to the advancement of science and society. He states that he will always present his results openly to the public, as he believes that knowledge should be shared. Milković concludes by saying that all well-intentioned cooperation is welcome, since only through joint work and an open approach is it possible to push the boundaries of what we know and believe to be possible.

Prepared by Milena Maglovski

BIOPLASTIC FILM – SUSTAINABLE BUILDINGS WITH PASSIVE COOLING

Sustainable and climate-resilient buildings are increasingly adopting passive cooling principles, reducing electricity consumption and relying on conventional cooling systems only when necessary. Researchers from Zhengzhou University in China and the University of South Australia have developed an innovative solution of this kind—a bioplastic cooling metafilm (BPCM).

Thanks to its thin, lightweight structure and ease of installation, the film can be easily adapted to various surfaces – from roofs and façades to integration into building materials. Although such innovations are often associated with new construction, their characteristics can also be highly beneficial for older buildings, where extensive construction work is difficult or not cost-effective. In addition to cooling, the film reduces the load on the power grid during hot months, which is essential for preventing power shortages and mitigating the urban heat island effect, when buildings further heat up cities.

An additional value of the film lies in its biodegradable material, which makes it environmentally friendly and helps reduce plastic pollution, as it contains no petroleum-based plastics. The film is made from biodegradable PLA (polylactic acid) derived from renewable sources such as corn starch. It is specially engineered to contain microscopic crystals and pores that help reflect sunlight and release heat.

Photograph: Unsplash/Nguyen Phan Nam Anh

exposure to UV radiation and acids, the film retains its efficiency, making it durable and reliable.

Simulations have shown that the film can reduce annual cooling energy consumption in warm cities by up to 20 percent. Currently, air conditioners and other cooling systems account for about 15 percent of global electricity use and contribute significantly to carbon dioxide emissions so that this innovation could help substantially reduce that impact.

Through this technology, passive cooling is no longer just a scientific experiment – it is becoming a practical solution for everyday life that saves energy, money, and natural resources while making cities more livable.

Although the film is not yet widely commercially available, early adopters in Phoenix and Las Vegas have reported cooling cost reductions of about 15–18 percent during the hottest summer periods. While the film alone cannot fully replace all cooling systems, when combined with renewable energy sources such as rooftop solar panels, it represents a sustainable solution for the future.

Prepared by Katarina Vuinac

Passive Cooling Systems

These systems use natural processes to keep buildings at a comfortable temperature without mechanical devices or electricity. In addition to materials such as bioplastic film, they include proper placement of windows and ventilation openings, as well as the installation of green areas. Their function is active 24 hours a day – during the day they reflect sunlight, while at night they release the accumulated heat.

How the Innovation Works

As a passive system, the film does not require electricity to operate – it functions independently. Instead of absorbing sunlight and allowing it to penetrate indoor spaces, the film reflects it back into space, creating a natural cooling effect. The bioplastic film has an exceptional reflectivity of 98.7 percent, meaning it repels most sunlight. In comparison, its high thermal emissivity of 96.6 percent allows accumulated heat to be efficiently released into space, further cooling the building. The microscopic structures within the film enable heat from the building to be emitted as infrared radiation that passes through the atmosphere and is radiated directly into space.

According to a study published in Cell Reports Physical Science, its structure allows buildings to remain up to 9 degrees Celsius cooler than the outside temperature during the hottest part of the day, while the average daily cooling effect ranges from 5 to 6.5 degrees Celsius. Even after prolonged

Photograph: Unsplash/Junway

THE MESSAGE IS IN NATURE: A FUSION OF ENERGY AND ECOLOGY AT THE BELGRADE FAIR

Two significant events — the 20th International Energy Fair and the 21st International Fair for Environmental Protection and Natural Resources (EcoFair) — were held this year under the joint slogan "The Message Is in Nature." Taking place in Hall 3 of the Belgrade Fair, the events brought together more than one hundred exhibitors and representatives of institutions, companies, and organizations from Serbia and abroad.

From October 20 to 22, Belgrade became a meeting point for experts in the fields of energy, ecology, industry, and science, who gathered to discuss the challenges and opportunities of sustainable development in the era of energy transition.

The manifestation, held under the patronage of the Ministry of Mining and Energy and the Ministry of Environmental Protection of the Republic of Serbia, provided a unique platform for dialogue on the future of the energy sector, the

The Energy and Environmental Protection Fairs once again demonstrated that dialogue between the energy and environmental sectors is essential for achieving sustainable goals

Photograph: Energy Portal

preservation of natural resources, and the implementation of innovative technologies.

Energy Security and the Green Transition

Opening the event, State Secretary at the Ministry of Environmental Protection, Dragana Ostojić, emphasized that the slogan of this year's fair reflects a simple yet fundamental truth — that many solutions to today's challenges already exist in nature, and that it is society's responsibility to recognize and apply them.

"These fairs are not in opposition to each other — together, they lead Serbia toward a green transformation. Maintaining balance is one of the key tasks of our ministry," Ostojić highlighted, noting that protected areas in Serbia today cover around 950,000 hectares, or 10.72 percent of the country's territory.

Maja Vukadinović, Assistant to the Minister of Mining and Energy for Energy Efficiency and Climate Change, reflected on Serbia's ongoing projects and steps in the energy transition.

"The global energy sector is undergoing a deep transformation, and Serbia, through the adoption of new regulations and strategic documents, is actively following that process. The Kostolac wind farm is currently in testing, while two large wind power plants are already in trial operation," said Vukadinović.

She also noted the state's efforts in energy efficiency, explaining that 43 public buildings were renovated last year with an investment of 3.4 billion dinars, and that new calls for project co-financing are expected in 149 local governments in the coming months.

Dalibor Nikolić, Director of the Technical System of Elektrodistribucija Srbije (EDS), presented projects aimed at improving the reliability and quality of electricity supply for 3.8 million users. EDS is currently implementing the reconstruction of low-voltage networks, the automation of medium-voltage systems, and the introduction of smart meters. Visitors at the fair also had the opportunity to explore the company's new mobile application for meter reading submissions and its modern contact center.

The Fair as a Hub for Knowledge Exchange and Partnerships

Over the course of three days, the Belgrade Fair became a vibrant meeting point for the exchange of ideas among representatives of state institutions, companies, research centers, universities, NGOs, and local communities.

Among the participants were major national energy players such as EPS and Srbijagas, along with numerous private sector representatives, including MT-KOMEX, Charge&GO, Elektrometal Green, Elektrometal Plus, Horius, Unipro Solutions, Dani, and Peštan. A notable contribution came from the Chamber of Commerce of Montenegro, which participated for the first time, bringing together four exhibitors — EPCG, Mezon, Ramel, and ETG Group.

More than 50 exhibitors from Serbia, Croatia, China, Montenegro, Russia, Ukraine, Turkey, and North Macedonia showcased their innovations in renewable energy, energy storage, grid digitalization, and energy efficiency in both the building and industrial sectors.

The accompanying conference program covered a broad range of topics — from investments in renewable energy and energy storage, to the integration of renewables into national systems, and practical sessions such as "How to Build a Rooftop Solar Power Plant." Particularly well-received were lectures on balancing energy security and environmental demands, emerging industrial technologies, and current developments in standardization.

The Energy and Environmental Protection Fairs once again demonstrated that dialogue between the energy and environmental sectors is essential for achieving sustainable goals.

At a time when the world is seeking ways to ensure energy security while protecting nature, Belgrade became — during these three days — a place where ideas for a greener future were transformed into tangible plans and partnerships.

Prepared by Milena Maglovski

Photographs: Belgrade Fair

ENERGY PASSPORT – THE ID CARD OF BUILDINGS

An energy passport is a certificate that outlines the energy performance of a building — an official document with a strictly defined format and content, issued by an authorized organization, and valid for a period of ten years. Its purpose is not to introduce another administrative requirement, but to provide owners and buyers with a clear and complete picture of how energy-efficient (or inefficient) a building is, depending on the category it falls into. Additionally, it provides insight into expected energy costs and recommends measures to reduce overall consumption.

The obligation to possess an energy passport stems from the EU Directive on the Energy Performance of Buildings (EPBD), which was first introduced in 2002. Serbia adopted it in 2005 upon joining the Energy Community. While specific systems vary from country to country, they share a common foundation — a scale of energy classes ranging from A to G, as well as mandatory categorization of buildings based on their energy consumption.

In Serbia, energy efficiency is expressed through energy classes — from A+, representing the highest level of energy performance, to G, assigned to buildings with poor characteristics and very high energy consumption. According to current regulations, new buildings must meet at least Class C standards. For reconstructions and renovations, it is required that the building's energy performance improves by at least one class compared to its previous state.

According to the amendments to the Law on Planning and Construction from 2023, the energy passport, which had already been a requirement for obtaining a construction and occupancy permit for new buildings, is now also mandatory for all existing buildings. The amendments stipulate that, within three years, all

The latest amendments to the Law on Planning and Construction stipulate that energy-efficient technical interventions may also be carried out on buildings protected as cultural monuments, provided that they are implemented in accordance with the methods and conditions prescribed by the competent institute for the protection of cultural heritage.

Photographs: (on the previous page) Unsplash/Axel Eres; (right) Unsplash/Alexander Gluschenko

public buildings must possess the certificate (deadline: August 2026), while business buildings are required to do so by 2028. Residential buildings have a ten-year deadline, which is practically until 2033. Once issued, the energy passport is valid for ten years. In the event of failure to meet this legal obligation within the prescribed period, according to current data, a fine ranging from 25,000 to 50,000 dinars is prescribed.

The issuance of the energy passport is based on an energy inspection of the building and project documentation. The energy inspection and certification process is carried out by a licensed engineer specializing in building energy efficiency, and the certificate is issued through the Central Register of Energy Passports (CREP) – an information system of the Ministry of Construction that maintains records of all issued documents and authorized organizations.

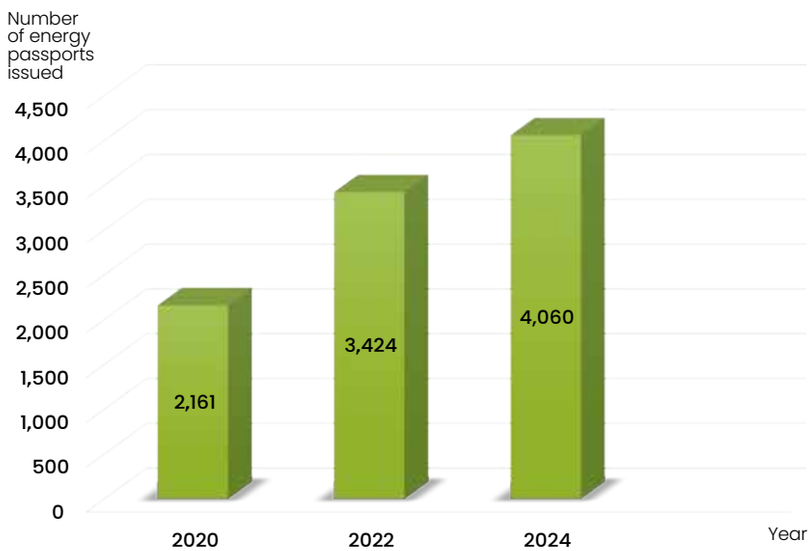
According to the Rulebook on the conditions, content, and method of issuing certificates on the energy performance of buildings, an energy passport for residential buildings usually consists of five pages. The first page contains basic information, including the owner's name, location, and a photograph of the building, as well as the designation of the building's energy class. The second page provides information on heating, cooling, and ventilation systems, the share of renewable energy sources, and data on the thermal envelope – walls, exterior doors, roof windows, and other categories. The third page presents, among other things, data on measured energy consumption, while the fourth contains recommendations for improvement, such as modernizing heating systems or enhancing insulation. The fifth page provides definitions of technical terms, such as: "Annual carbon dioxide emission (CO [kg/a]) represents the mass of carbon dioxide emitted into the external environment during one year as a consequence of the building's energy needs."

According to the rulebook above, there are also exceptions. For example, an energy passport is not mandatory for buildings with a planned lifespan of up to two years, certain temporary structures, buildings that are not heated or are heated to a temperature of up to 12°C, buildings used for religious purposes, and other categories defined in the rulebook.

for all newly constructed buildings. According to CREP data, about 80.28 percent of all buildings fall into this energy class. They are followed by Class B buildings, which comprise approximately 7.8 percent, while buildings classified in Classes D, E, F, and G – representing lower energy performance – account for a total of around 8 percent. The remaining 3.91 percent of buildings belong to other categories.

In terms of territorial distribution, CREP reports that the number

The number of issued certificates continues to increase year after year:



An energy passport is not mandatory for buildings with a planned lifespan of up to two years, certain temporary structures, buildings that are not heated or are heated to a temperature of up to 12°C, buildings used for religious purposes

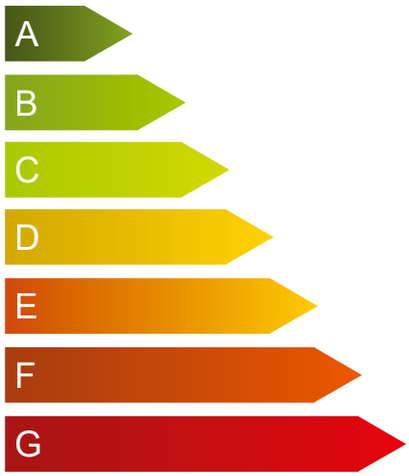
Data from the Central Register of Energy Passports (CREP) – Current Situation in Serbia

According to the latest data provided by the Central Register of Energy Passports (CREP), as of September 30, 2025, a total of 21,693 energy passports have been issued in Serbia.

When it comes to energy classes, the most common is Class C, which also represents the legal minimum

Photograph: Pixabay/Markus Winkler

In Serbia, energy efficiency is expressed through energy classes — from A+, representing the highest level of energy performance, to G, assigned to buildings with poor characteristics and very high energy consumption



of issued energy passports largely follows the number of constructed and reconstructed buildings, as well as the population density and level of economic activity in a given area. In other words, the largest number of certificates is issued in major cities and more developed regions of Serbia, where construction activity is most intensive.

Energy Passports as a Tool Against Energy Poverty

Serbia has undertaken the obligation to align its energy sector with European standards and to implement essential reforms in the field of energy efficiency. It is precisely within this framework that two concepts intersect, which, although they may seem separate to some, are in fact deeply connected — the energy passport and energy poverty.

In March of this year, the Chamber of Commerce and Industry of Serbia published a document titled Guide to the Energy Passport and, with the support of the Heinrich Böll Foundation, organized a seminar on the topic. This document clearly outlines the relationship between the two concepts, as well as the importance of building certification in reducing energy consumption.

First and foremost, energy poverty refers to the inability of households to secure sufficient energy for basic needs such as heating, cooling, or lighting. It results from a combination of low income, high energy costs, and poor energy performance of buildings. In Serbia, according to data from the aforementioned guide, this problem affects around 200,000 households. An additional challenge comes from the large number of unregistered buildings — nearly two million — which, as they are not included in official records, cannot be covered by energy renovation programs or state subsidies, thereby further deepening social and energy inequality.

This is where the energy passport gains its broader social role and application — as a tool for overcoming energy poverty. Since it provides a transparent overview of a building's energy performance and specific recommendations for improvement, households can, based on this information, identify where they are losing

energy and money. Meanwhile, the state gains a foundation for designing targeted assistance programs, such as subsidies, furnace replacements, and energy renovation projects.

The most important piece of data in an energy passport is the energy efficiency parameter – the amount of heat required to heat a building during one year, expressed per square meter of heated surface. In Europe, according to the latest available data and the Guide, approximately 40 percent of the total energy produced is spent on heating and cooling buildings. In Serbia, this share reaches 47 percent, clearly indicating that the building sector is a key link in the energy transition.

Therefore, energy passports and systematic investments in improving energy efficiency represent the foundation of every serious policy aimed at reducing energy poverty and protecting the environment.

Prepared by Milica Vučković

Illustration: Pixabay • Photograph: Pixabay/Raad

FROM BIOMASS TO WATER DROPLETS

Biomass itself is not a source of water — it is chemically transformed into a hydrogel, a material that functions as a "tool" for capturing moisture from the air

Water is the source of life — our most precious resource, whose availability must never be taken for granted. Unfortunately, we live in a time when climate change, environmental pollution, and the uncontrolled exploitation of resources are leading to increasingly frequent shortages of clean water worldwide.

According to data from the European Environment Agency three years ago, more than one-third of the EU population and nearly half of its territory faced seasonal water scarcity. Cyprus, Malta, and Romania were among the most affected when comparing water consumption with renewable resources in 2022. The situation is, of course, far more complex in sub-Saharan Africa, where millions of people lack stable access to safe water sources and often walk kilometers to reach the nearest well. In South Asia, particularly in India and Bangladesh, rapid population growth

Photographs: (top) Pixabay/ Antonio López; (middle) Pixabay/**Duyệt Trần Văn**

and groundwater pollution exacerbate water supply challenges. Meanwhile, the Middle East and North Africa are increasingly hit by droughts, leaving countries such as Yemen and Sudan among the most vulnerable.

In an effort to improve resource protection, the European Union recently reached an agreement to update the list of pollutants that member states must monitor in surface and groundwater. For the first time, pharmaceuticals have been included, along with new pesticides (including glyphosate) and certain PFAS substances. However, while this decision may appear to be a significant step forward, experts caution that it has serious shortcomings. Member states have managed to postpone the implementation of these new standards until 2039, with the possibility of extending them even further to 2045 — meaning that the real impact of these measures will be delayed for decades.

Furthermore, the agreement weakened the non-deterioration principle from the EU Water Framework Directive, introducing exceptions that allow short-term negative impacts and quality deterioration in cases of water or sediment transfer. Environmental organizations believe that this opens the door to increased discharge of toxic substances into rivers, while industrial lobbies continue to pressure the Commission to further weaken environmental protection. Experts warn that repeated delays leave insufficient time for member states to incorporate measures against new pollutants into their river basin management plans by 2027.

In such circumstances, it is clear that, in addition to the regulations being implemented, the world is also seeking innovations and solutions that can provide water where it is scarce. One such solution has been developed by researchers from

the University of Texas at Austin. Their method, based on molecular engineering, enables a wide range of natural materials — from food waste to twigs or seashells — to be transformed into a hydrogel sorbent capable of absorbing moisture from the air and releasing it as water. This process is based on sorption — the ability of a material to attract and retain water molecules. Sorption includes two processes: adsorption and absorption. In the case of biomass-based hydrogels, absorption is the key process, as the biomass hydrogel acts like a sponge, possessing a molecularly modified structure that attracts and binds water molecules. When the hydrogel is later gently heated, this bound water is released in the form of droplets that can be collected as drinking water. Almost any natural material based on plant polysaccharides — such as cellulose, starch, or chitosan — can be turned into an efficient water harvester.

Therefore, biomass itself is not a source of water — it is chemically transformed into a hydrogel, a material that functions as a "tool" for capturing moisture from the air. In this process, air is the actual source of water. At the same time, biomass serves as the raw material used to create a material capable of retaining that moisture and later releasing it.

The field test results are exceptional. While other technologies typically produce between one and five liters of water per day per kilogram of material or sorbent, these hydrogels can generate up to 14 liters. This amount can be sufficient to meet some of a family's basic daily water needs, especially in smaller communities or during crisis situations.

The advantages are clear: the material is inexpensive, widely available, and biodegradable, while the technology supports sustainable water production. However, there are also certain limitations. One of them is that the amount of water produced depends on the humidity level in the air. In addition, there is a strong likelihood that the collected water must undergo a simple verification or treatment process before it can be used for drinking or commercial purposes.

The essence of this discovery lies in its simplicity — from what is considered waste, a system is created that extracts the most vital resource — water — from the air.

Prepared by Milica Vučković

Photograph: Unsplash /Vanessa Schmid

AN INNOVATION CONNECTING GLASSMAKING TRADITION AND SUSTAINABILITY

Researchers from Serbia, in collaboration with colleagues from Denmark and Slovenia, are developing a unique digital tool — a carbon footprint calculator designed for creative workshops and artists working with glass. This innovative instrument will enable makers of handcrafted glass objects to accurately calculate greenhouse gas emissions generated during production, while also encouraging them to reconsider materials, techniques, and design decisions in search of more sustainable solutions.

According to Prof. Dejan Molnar, PhD from the Faculty of Economics, University of Belgrade, a member of the research team within the project "Glassmaking Tradition Meets Innovation," glass production is highly energy-intensive and represents a significant source of CO_2 emissions. This is precisely why the calculator can play a crucial role for artists and craftspeople who use glass as their primary material.

By having a measurable and quantifiable ecological footprint, artists and artisans will be encouraged to reflect on possible ways to make their production processes more environmentally friendly

Photograph: Karolin Raj

"Its use will help raise awareness by providing more precise information and data about the negative environmental effects of glassmaking," explains Professor Molnar. "By having a measurable and quantifiable ecological footprint, artists and artisans will be encouraged to reflect on possible ways to make their production processes more environmentally friendly."

How the Calculator Works

The calculator will enable artists to calculate gas emissions for each individual item — from glass trays and lamps to jewelry or decorative pieces. Users will input data on raw materials used, electricity and water consumption, fuel for transportation, and the amount of waste generated. Based on these inputs, the tool will provide a precise overview of the CO_2 produced for each item.

"Artists and craftspeople are often not fully aware of how much energy their work — such as heating, melting, or polishing glass — consumes, and how much CO_2 it emits," explains Prof. Molnar. "The calculator will help them determine the emissions associated with each product they make. Most importantly, it will allow them to identify which stages of their production process generate the highest levels of greenhouse gases."

Changes in Practice and Market Impact

The creators of the calculator expect that this tool will contribute to raising awareness and encourage glassmakers to start thinking in terms of "kilograms of CO_2 per kilogram of glass."

"Some of the changes we can expect in the future include switching to electric furnaces and using green energy, utilizing excess heat generated in furnaces, increasing the use of recycled glass, introducing more energy-efficient glass processing machines, reducing waste, adopting eco-friendly product and packaging design, and strengthening cooperation with local raw material suppliers to reduce transport-related emissions," explained Prof. Molnar.

The development of the calculator involves several partners: the Foundation for the Advancement of Economics (FREN) in Belgrade, the Institute for Creative Entrepreneurship and Innovation in Paraćin, the Creative Glass Serbia Initiative, the Rog Center in Ljubljana, and the Museum Sydøstdanmark – Holmegaard Værk in Denmark. The project, co-financed by the European Union, runs from November 2024 to June 2027.

Prof. Molnar particularly emphasizes the importance of the Creative Glass Serbia Initiative:

"Our collaboration with the Creative Glass Serbia Initiative means a lot to us. The initiative is dedicated to revitalizing the glassmaking tradition and fostering innovation in this field through circular, digital, and social dimensions. Over the past years, the Initiative has accumulated extensive knowledge and experience in promoting new approaches to interpreting, using, and affirming the industrial heritage of glassmaking through creative entrepreneurship."

Prof. dr Dejan Molnar, PhD
Faculty of Economics, University of Belgrade

The project's results will be tested in three Creative Glass LABs located in Ljubljana, Fensmark, and Paraćin, where European artists will have the opportunity to experiment and create 12 new glass artworks.

The carbon footprint calculator, which will be launched in October 2025, represents a significant step toward more sustainable artistic creation. It will not only help artists reduce their environmental impact but also open doors to new markets that increasingly value "green" and responsible products.

In this way, the tradition of glassmaking gains a new dimension — one that connects creativity, innovation, and sustainability.

Prepared by Milena Maglovski

Photographs: (Molnar) courtesy of Dejan Molnar; (bottom) Elšika Pozdankova

A FRUITFUL AUTUMN IN THE WORLD OF INNOVATION – BUILDING MATERIALS OF THE FUTURE

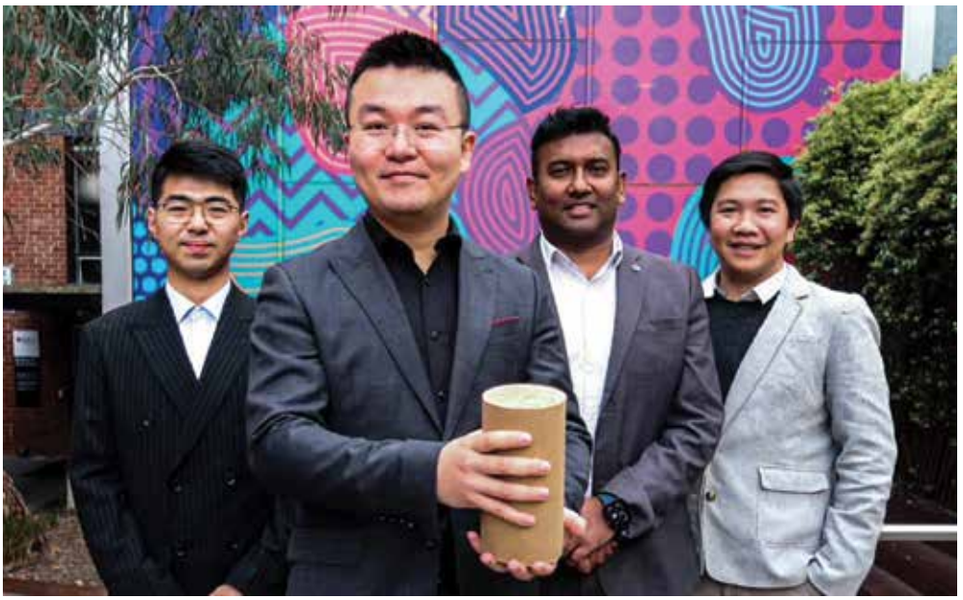
Natural materials are becoming increasingly important in replacing fossil fuel–based insulation products and enabling sustainable solutions for more energy-efficient buildings. The current year has proven to be particularly fruitful in the field of sustainable architecture, and early autumn brought news of two significant discoveries in the area of construction materials.

The first is a mushroom-based insulation material that is currently being tested for its flexibility, moisture resistance, and thermal conductivity. The second is a building material that combines cardboard, water, and soil.

The Mycobuild Project

Researchers at the Hof University of Applied Sciences in Germany have developed an innovative insulation material made from fungal mycelium (the root structure of fungi), while their industrial partner, Johann Bergmann GmbH &

Photographs: (top) RMIT University; (bottom) Hof University of Applied Sciences



Co. KG, is testing the possibilities for large-scale production. The Mycobuild Project has a long-term goal of transferring research results into industrial applications. Insulation made from fungal networks could offer significant environmental and economic benefits. The project aims to demonstrate industrial feasibility by March 2026 and contribute to the development of environmentally friendly construction methods for the future.

Mycelium grows on a substrate made from local agricultural residues such as straw, binding the material into a compact mass before being dried and heated to deactivate the fungus. The primary challenge lies in maintaining sterile conditions, as even minor contamination can render the entire culture unusable.

"Fungal networks offer numerous advantages: they are compostable, store CO_2, and require less energy to produce than conventional insulation materials. They can be flexibly shaped and scaled up for industrial production," said Professor Robert Honke.

Domestic fungal species — such as oyster mushrooms, honey mushrooms, porcini, and giant puffballs — have proven particularly promising. They grow at room temperature without the need for additional heating or cooling, making production highly energy efficient. The oyster mushroom stands out as the most resilient, spreading rapidly and forming dense networks. However, cultivation carries risks, as competing microorganisms can destroy the entire growth cycle. For this reason, developing a protective mineral coating plays a crucial role; once full moisture resistance is achieved, the material could exhibit the same or even superior properties compared to traditional insulation.

Cardboard and Earth for Green Construction

A material known as cardboard-reinforced rammed earth consists solely of cardboard, water, and soil, and is fully reusable and recyclable. It was developed in Australia, where more than 2.2 million tons of cardboard and paper are sent to landfills each year, while cement and concrete production accounts for around eight percent of global annual CO_2 emissions.

A research team from RMIT University claims that this new building material has a carbon footprint four times lower than that of concrete — and in this case, it is completely eliminated.

Walls made from cardboard, soil, and water are strong enough to support low-rise structures, while being significantly cheaper and more climate-friendly than concrete. One of the advantages of this material is that it can be produced directly on-site. Massive rammed-earth walls naturally regulate temperature and humidity, reducing the need for air conditioning and lowering emissions further.

"This innovation could revolutionize the way we design and construct buildings, using locally available materials that are easier to recycle. It also reflects a global return to earth-based construction, driven by net-zero emission goals and a growing interest in sustainable local materials," said Professor Zhijing Ma from RMIT University.

Researchers have developed a formula that allows the calculation of wall strength based on the thickness of the cardboard forms. In parallel studies, they also demonstrated that combining rammed earth with carbon fibers can achieve strength comparable to that of high-quality concrete.

The authors emphasize that this innovation could become a key to greener and more affordable construction — particularly in regions abundant with soil suitable for such technology.

Prepared by Jasna Dragojević

Photographs: (top) RMIT University; (middle) Hof University of Applied Sciences

VÄXJÖ – THE CITY THAT CHOSE TO DEFEAT CLIMATE CHANGE

In southern Sweden, nestled among the lakes and forests of the Kronoberg region, lies a city that has been called the greenest in Europe for decades. This is Växjö – a university center of around one hundred thousand inhabitants, which, as early as 1996, made a decision that would change its future: to become the first city in the world free from fossil fuels.

Today, nearly three decades later, Växjö stands as a symbol of sustainability and a pioneer in the fight against climate change. While many are still searching for a way to reduce emissions, this Swedish city demonstrates that it is possible to combine urbanization, economic growth, and quality of life with environmental responsibility.

The city generates heat and electricity from biomass — waste from the wood industry, such as branches, bark, and sawdust

Photograph: Pexels/Хитрый Хряк

Sustainable Cities Around the World

Although Växjö is a pioneer, it is far from alone in its mission. Many cities across the globe are implementing innovative measures that prove meaningful change can start within local communities:

COPENHAGEN (Denmark) – plans to become the first carbon-neutral capital in the world by 2030. Investments in cycling infrastructure and wind farms have made it a global symbol of sustainability.

FREIBURG (Germany) – known as the eco-capital of Germany, this city features entire neighborhoods built according to the principles of passive and energy-efficient architecture, along with a strong culture of recycling.

REYKJAVIK (Iceland) – relies almost entirely on geothermal and hydropower, while its transportation strategy focuses on the transition to electric and hydrogen vehicles.

PORTLAND (USA) – a pioneer of sustainable urbanism in North America, with a strong emphasis on public transportation, cycling, and preserving green areas within the city.

LJUBLJANA (Slovenia) – the first capital in the region to earn the title of European Green Capital (2016), thanks to closing its city center to cars and investing heavily in pedestrian and cycling zones.

All of these cities, much like Växjö, demonstrate that sustainability is not a one-time action but a long-term strategy — one that requires political will, citizen engagement, and smart resource management.

Energy from the Forest – The Power of Local Resources

Sweden is known for its vast forests, and Växjö has turned them into the backbone of its energy system. Instead of relying on oil and coal, the city generates heat and electricity from biomass — waste from the wood industry, such as branches, bark, and sawdust. As a result, the city's district heating system is now almost entirely free of fossil fuels.

The outcome? Carbon dioxide emissions per capita have been reduced by more than 60 percent compared to 1993. This is not just a statistic — it is proof that persistence and smart planning pay off.

Another unique feature of Växjö is its architecture. Instead of building with concrete and steel, the city invests in timber construction. New residential and public buildings are largely made of wood, which significantly reduces the carbon footprint of the construction sector.

In this way, Växjö not only lowers emissions but also shows how tradition can go hand in hand with modern technology and design.

The City of Bicycles, Pedestrian Zones, and Electric Buses

In Växjö, cars are not the dominant means of transport. With over 300 cycling paths woven throughout the city, electric buses and biofuels produced from household organic waste are increasingly taking the lead in public transportation. The goal is clear – to reduce emissions from transport, one of the most persistent sources of pollution.

For its efforts, Växjö received the prestigious European Green Leaf Award in 2018, and European and global media regularly refer to it as the greenest city in Europe. Yet what matters even more is that Växjö has become a model for other cities – from major metropolises to small municipalities – that aim to make their communities more sustainable.

Why We Should Look Up to Växjö

What sets Växjö apart from many other cities is its consistency. Sustainable development is not just a phrase on paper – it is woven into every aspect of life: from energy and transportation to architecture and waste management. The city is governed by policies in which citizens actively participate, goals are publicly available and measurable, and results are transparent.

Växjö demonstrates that climate change cannot be overcome overnight, but the path to success is clear: an ambitious goal, a concrete

strategy, and persistent implementation of every measure.

While the world continues to search for ways to reconcile population growth, urbanization, and environmental preservation, Växjö teaches us that sustainability is not a luxury – it is a necessity. Its story is an inspiration for all cities and proof that when a community unites around a shared vision, it is possible to create a future where both nature and people truly feel at home.

Prepared by Milena Maglovski

Photographs: (interfile from top to bottom) Pixabay/MARKTPLATZRehburg-Loccum; Couleur; Marcel Dominic; Portlandenglish; Iva Balk; (right) Unsplash/Marianna Lutkova

DOUBLE HOLDER OF THE OPEC FUND'S MASTER OF INNOVATION TITLE

Innovation is the driving force of modern society — through new ideas and approaches, it generates solutions that improve the quality of life and stimulate economic growth. Innovators do not accept limitations; instead, they seek ways to make things faster, simpler, and more effective. One such innovator is Zoran Dujaković, from the Republic of Srpska, who has received the Master of Innovation title for the second time, awarded by the OPEC Fund for International Development (OFID) — an international development organization established to support innovation and sustainable development projects.

He has an impressive portfolio of awards and recognitions for his inventions, particularly in the fields of environmental protection, the automotive industry, and medicine, where he developed an immobilizer that completely replaces plaster casts. In addition to his work as an innovator, Dujaković is also a diving instructor with international certifications and a speleologist. It is therefore no surprise that the innovation for which he received this latest recognition is designed for cave diving applications.

A special technique prevents water from entering the diving tank, allowing it to be refilled completely — as if done on the surface — and thus enabling the diver to continue diving safely. Thanks to this underwater charger, it is also possible, for example, to extract oil from a sunken tanker without spilling it into the sea

Photographs: courtesy of Zoran Dujaković

Having practiced this discipline himself, he realized how dangerous it can be when, during a dive, it is impossible to surface safely. This insight led him to create a device that enables safe and environmentally friendly refilling of diving tanks underwater. The invention, called the Underwater Air and Liquid Media Charger, has already received awards in Europe.

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Dujaković is also a diving instructor with international certifications and a speleologist

When it comes to innovation in our region, Dujaković notes that there is little investor interest in supporting such projects, which is why he plans to personally finance the production of several hundred units and offer them to diving centers worldwide. He received the Master of Innovation award for the first time two years ago, during a cycle of exhibitions held in the United States, where the competition took place in six cities, and in five of them, he won a gold medal.

"Besides me, there were other participants from Bosnia and Herzegovina as well. If you win three or more gold medals, you earn the right to receive this title. I believe there were about 60 people worldwide who received that recognition that year. I didn't exhibit anything last year, but this year I participated online in Japan and Australia. They prepare all the documentation for every exhibition that belongs to the same cycle, and the juries convene on the same day. There's no lobbying like we often see here," explains Dujaković, emphasizing the seriousness and credibility of the institutes involved in these events.

In the near future, he plans to develop and test his patent for a conical turbine in Nepal, a country he visited a year ago.

"There, everything functions as long as there's daylight and sunshine, but by eight in the evening, people already go to bed. They have severe shortages of energy sources. They dry yak dung, mix it with kerosene, and it provides decent heating. Since they don't have many by-products, they heat for only a short time during the day. They also face infrastructure problems in the energy sector. Somehow, they found out about me and offered to collaborate — to try to create a prototype. It would be for an institute within a university," Dujaković says.

The core idea of this invention is a single pipe that, with patented internal components and a generator, can produce a specific amount of energy depending on its diameter, length, slope, and water flow.

"Regardless of calculations, these elements must be tested and proven in practice," he adds, noting that his trip to Nepal has been postponed for now due to the recent political unrest in the country.

Protected Works

Dujaković, who has been involved in innovation for many years, has so far submitted several works to the Institute for Intellectual Property of Bosnia and Herzegovina and to the International Patent Office. His first patented invention, registered back in 2007, was a mobile scaffold designed for work at heights. One of his earlier inventions, for which he also received medals, is a detection system for continuous and field detection of people, animals, and objects — without posing any risk to the handler or the dog.

Prepared by Jasna Dragojević

REGIONAL ARCHITECTURE SUMMIT 2025: EDUCATION AND TRADE FAIR FOR ARCHITECTS ACROSS THE REGION

The second Regional Architecture Summit, SFERA 2025, held in Sarajevo on October 17–18, brought together a large number of exhibitors and experts from across the region and the world. The summit was organized by Sfera d.o.o. Mostar, Bosnia and Herzegovina, and the regional professional magazine for construction and architecture, m-Kvadrat.

Once again, Sarajevo became the center of regional and global architecture, hosting prominent figures from the architectural scene of Bosnia and Herzegovina, Croatia, Serbia, Slovenia, Montenegro, Austria, Norway, and the United States.

"We had truly exceptional speakers who shared their insights on architecture, projects, challenges, and more. The goal of this event is to bring together professionals and academics in one place, giving them the opportunity to communicate, collaborate, and exchange experiences and knowledge. The summit comprises two parts: the scientific and the exhibition sections. The scientific part includes lectures and presentations by experts on architectural topics, while the exhibition part features companies from the region presenting their latest innovations, products, and trends — all aimed at architects. It's a perfect combination of profession and science, all in one place," said Elvira Drežnjak, coordinator of the Regional Architecture Summit SFERA 2025.

The summit was conceived based on long-term collaboration with companies and experts in the construction and architectural sectors, as a continuation of the international

Photograph: Regional Architecture Summit „Sfera 2025"

scientific and professional conference series SFERA. It was first held in October 2023, attracting more than 1,000 visitors from across the region.

"In addition to the many projects we work on, the various themed publications we produce, and the events we organize, we also publish the regional professional magazine for construction and architecture, m-Kvadrat. In Bosnia and Herzegovina, it is the only specialized magazine covering this field. It has been published monthly since 2008, and through it, we have established excellent collaborations with companies, architects, engineers, investors, chambers, and other professionals — our target audience. After several years of publishing the magazine, we expanded into organizing scientific and professional conferences and trade fairs in the field of construction and architecture, which are held twice a year," said Elvira Drežnjak.

She added that the conferences cover a wide range of topics, including climate control, heating and cooling systems, concrete technology, roofing systems, façades, and ventilated claddings, among others.g

The summit brings together regional and international architects, experts, and lecturers, creating a unique platform for networking, exchanging ideas, exploring collaboration opportunities, and sharing valuable experiences and advice. Special attention is given to education, particularly for young talents entering the world of architecture, providing them with the opportunity to hear recommendations, acquire new knowledge, and understand the real-world challenges and opportunities that await them. Alongside the educational component, the event also features a trade fair section, where visitors can explore the latest materials, trends, and innovations in design and architecture, as well as receive insights and practical advice directly from industry professionals.

Elvira Drežnjak

Coordinator of the Regional Architecture Summit SFERA 2025.

The organizers emphasize that preparing an event of this scale requires tremendous effort, but that all the hard work pays off many times over.

"When the summit officially opens, when every seat is filled, when interest is high and the lectures and exhibition begin — it becomes much easier to follow through with the rest of the event. Of course, until the very end, all of us from the organizing team remain available for any inquiry or assistance, ready to respond and ensure everything runs smoothly. The satisfaction and happiness we feel when the event concludes successfully is truly indescribable," said Elvira Drežnjak.

The next summit is scheduled to take place in two years, with organizers announcing that it will be even more advanced and innovative.

In addition to this, preparations are already underway for another major event — "Home & Garden Interior Design 2025 with Amir Vuk Zec," scheduled to take place on December 9, 2025, at Hotel Hills in Sarajevo. They will also bring together regional architects and design professionals.

Prepared by Jasna Dragojević

Photographs: Regional Architecture Summit „Sfera 2025"; (Drežnjak) courtesy of Elvira Drežnjak

THE GENEX TOWER – SMART BUILDING BEFORE THE DIGITAL AGE

When the famous Genex Tower was completed in 1980, Belgrade gained a new city landmark, and Yugoslavia acquired yet another tangible symbol of its ambition. In fact, the structure consists of two towers — one commercial and one residential — connected by a bridge near the top of the 35-story building, forming a 117-meter-high concrete giant that stood as a testament to the city's urban confidence and technological progress of the time.

On the bridge connecting the residential and office towers, a digital clock was installed, displaying not only the time but also the air temperature — a distinctive visual emblem of a new era. Thanks to its technical organization, centralized systems, and modern features that operated as a well-coordinated mechanism, the building is often considered a precursor to the smart buildings of today, even though the term now mostly refers to contemporary

Photograph: Unsplash/Nikola Aleksić

structures equipped with sensors, digital platforms, and energy-monitoring applications.

Although much has been written about the Genex Tower, its true story can only be fully understood from within — through the perspective of its residents. One such insider, Samuil Petrovski, president of the Evangelical Student Association and a Protestant pastor, lived in the tower on the 28th floor during its golden years. He recalled what life was like behind the concrete walls in the final decades of the 20th century. His account reveals a vibrant community where daily life is intertwined with technological innovation and social rituals.

To begin with, the area where the skyscraper was built was once marshy, sandy, and exposed to strong winds. Nevertheless, it became home to what was then the tallest building in the Balkans. Its façades were constructed in *béton brut* — also known as raw or exposed concrete — while its foundations were laid using a specific technique that reached several dozen meters deep, as was often noted at the time. Each tower had two staircases integrated into the circular concrete side units, achieving a balanced and harmonious appearance.

This design solution stemmed from the firm vision of architect Mihajlo Mitrović, who insisted that the project be executed precisely in this form, despite initial plans calling for a different concept. The tower was surrounded by so-called military residential buildings intended for army personnel. Nevertheless, only the Genex Tower was equipped with a large atomic shelter.

"During the NATO bombing in 1999, whenever the sirens went off, many people from the surrounding buildings would come down to our shelter," explained Petrovski.

The lower tower, positioned along the highway, served as the business section used by the company Generalexport–Genex, one of the largest Yugoslav enterprises. Founded in 1952, the company operated for several decades with more than 60 subsidiaries worldwide. It conducted business on nearly every continent, owned a small airline, the well-known travel agency Jugotours, as well as hotels and apartments throughout the country.

At the top of the business tower, there was a restaurant with a rotating floor—a true symbol of modernity at the time. However, it was never open to residents or the public, serving exclusively for the company's business meetings.

The taller tower was designated as the residential section, with two entrances—A and B—located at number 41. In the first entrance, each floor contained two large apartments, while the second entrance had four smaller ones. The apartments did not have balconies, except on the 22nd floor. "I never heard why that was the case," our interlocutor recalled with a smile.

Samuil Petrovski

President of the Evangelical Student Association and a Protestant pastor

What stood out the most were the technical solutions, which is why the tower is often regarded as the first smart building of its time. When Petrovski lived in entrance A, the most modern elevators were installed, and the building featured a unique central control room equipped with switches and devices used to manage the elevators and monitor the entire electronic system of the tower—an impressive innovation for that era.

"Although the elevators were modern, they required regular maintenance, so we had our own elevator technician who lived on a mezzanine floor and was always available. In addition, there was a doorman—a retired resident of the building—who lived on the 10th floor and kept a record of visitors in the lobby, doing it almost voluntarily," said Petrovski.

One of the most advanced features was the central waste disposal system. The opening was located

Photographs: Pixabay/Xoracio; (Petrovski) courtesy of Samuila Petrovskog

near the elevator; residents would place the bin inside, shake out the contents with a few movements, and the waste would descend through about twenty floors into a container at level -1, from which garbage from the entire building was collected and removed, Petrovski explained.

Behind the country's and the Balkans' tallest building of its time lay a rich and lively social life. Living on the 28th floor, Petrovski recalled how, during his elevator rides down, it was almost impossible not to stop on several floors along the way—so conversations in the elevator became part of everyday life. He remembered that in the basement of the building, a youth community would often gather, spending hours talking and playing table tennis. On the newly paved square in front of the tower, children played football and other games. Everything was highly functional and well-organized, and the building had a genuine sense of community spirit.

The first problems began in the 1990s. Sanctions and shortages took their toll. Spare parts for elevators were no longer available, and apartments were being privatized. Residents adapted as best they could—when one entrance's elevators were out of service, they would use the other entrance instead. However, the elevators in the residential tower increasingly stopped working, while those in the business tower—where the Genex company was located—continued to operate mostly. On several occasions, even emergency medical services used those elevators, crossing the bridge between towers to reach the residents, Petrovski recalled. The Genex employees were always helpful—they would raise the ramp, open their garage for ambulances, and lend the use of their elevator when needed.

In the early 2000s, a tenants' council was established for both entrances. This led to the idea—and eventually a strategic agreement—with the company Zepter, thanks to which revenues from advertisements placed on top of the tower were used to renovate the elevators and entrances, as well as to install cameras and a sound system.

Although the business section of the complex is today non-functional and largely deteriorated, the residential part remains alive.

"My mother still lives in the building," said Petrovski, recalling more details from everyday life. "Summers were much milder back then—the concrete held in the cool air for a long time, and we didn't need air conditioning. But today, the side exposed to the afternoon sun struggles during heatwaves."

More than four decades after its construction, the Western City Gate—the name it soon earned due to its position—bears the marks of time yet still stands as a recognizable sentinel at Belgrade's entrance, even as the city has expanded far beyond it. Visible signs of decay can be found both on the plaza in front and within the building itself. The Genex company, after which the tower was named, no longer exists. Still, the architectural and urbanistic value of the structure remains beyond question.

The tower endures as a material testament to the Brutalist era and as one of the few Belgrade buildings featured in numerous domestic and international publications, including National Geographic and the third volume of the French edition Architecture contemporaine, which helped cement its recognition beyond local borders.Its value and status were reaffirmed in recent years when, in 2021, upon the proposal of the Institute for the Protection of Cultural Monuments, it was officially declared a Cultural Monument. This decision elevated its importance to an institutional level and confirmed its role not only as an architectural but also as a cultural symbol of Belgrade.

Prepared by Milica Vučković

Photographs: Unsplash/Daniela Legotta

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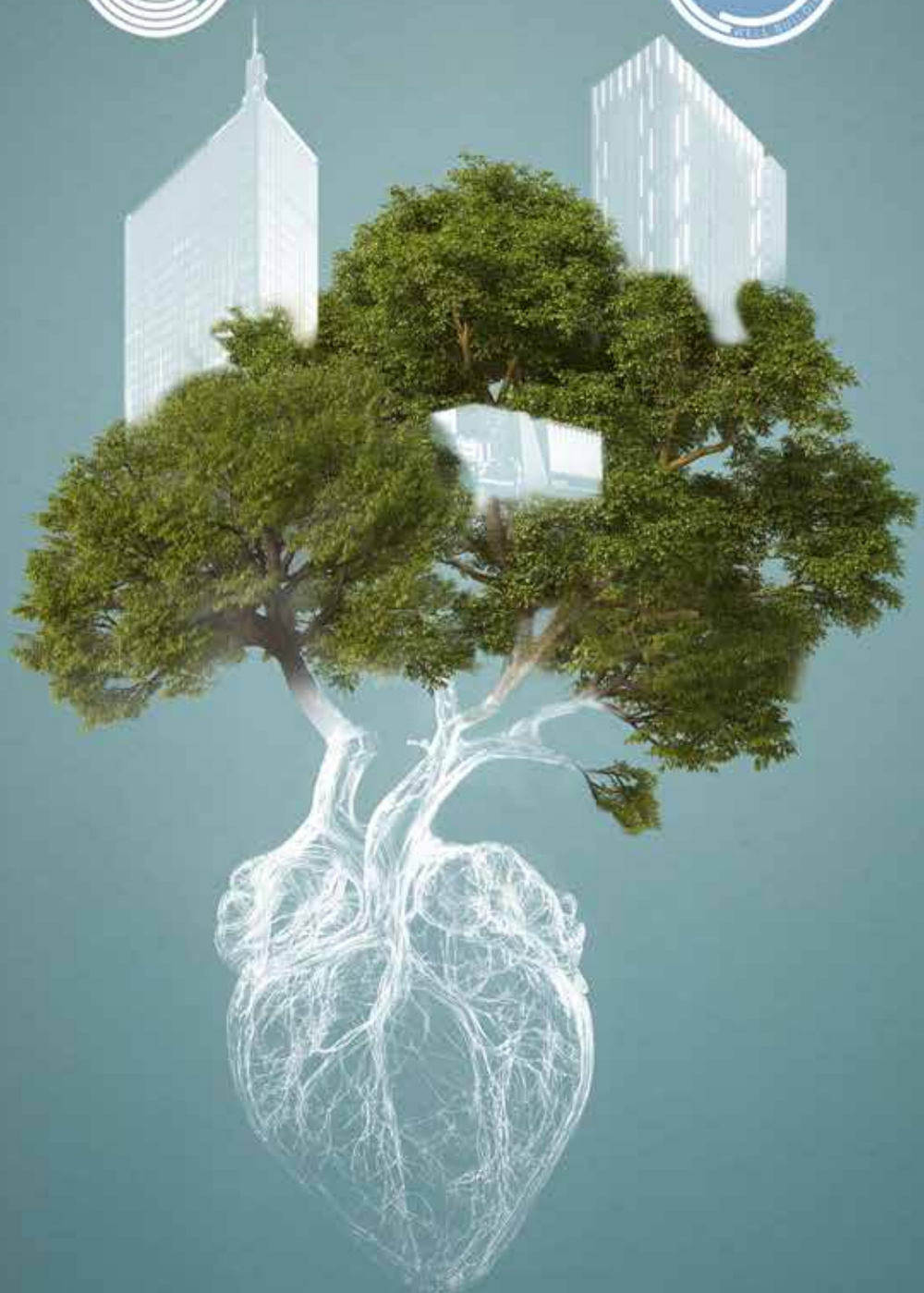

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