NR. 46 ■ 2026

ENERGY PORTAL magazine

ISSN 2560-6034

Data Centers as the Foundation of Serbia's Digital and Energy Transition

Ioanna Efthymiadou
Ambassador of Greece to Bosnia and Herzegovina

Vision-Led Energy Transition: What BiH Can Learn from Greece

SIEMENS
A RELIABLE PARTNER IN THE DIGITALIZATION OF THE ENERGY SECTOR

SET
SAMIT ENERGETIKE TREBINJE

AI POKREĆE I KREIRA ENERGETSKU BUDUĆNOST REGIONA!

25-27. MART 2026.
J.U. KULTURNI CENTAR TREBINJE

PRIJAVI SE >> SETREBINJE.COM

INSTITUCIONALNI POKROVITELJI

MINISTARSTVO VANJSKE TRGOVINE I EKONOMSKIH ODNOSA BIH

ВЛАДА РЕПУБЛИКЕ СРПСКЕ

ORGANIZATORI

EPC

SET
SAMIT ENERGETIKE TREBINJE

GENERALNI POKROVITELJ

Влада Републике Српске
Министарство енергетике и рударства

GENERALNI SPONZOR

ELNOS GROUP

WORD OF THE EDITOR

ENERGY PORTAL MAGAZINE
Five times a year
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- (Beograd : Birograf Comp). - 30 cm

Pet put godišnje. - 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,

The Fourth Industrial Revolution is no longer the future – digitalization and automation are rapidly shaping everyday life, transforming the way we work, think, and produce. While some still view new technologies with caution, others recognize in them an opportunity to improve processes, increase efficiency, and reduce environmental impact. It is precisely this positive side of digital solutions that we sought to explore in this issue, uncovering which innovations the Serbian industry can implement as early as today.

In this edition, we spoke with the Ambassador of Greece to Bosnia and Herzegovina, Ioanna Efthymiadou, who shared valuable insights from her country's experience in energy transition, as well as guidelines that may benefit Bosnia and Herzegovina on its path toward accelerated green transformation.

We also visited the Municipality of Brod in the Republic of Srpska, where we spoke with Mayor Milan Zečević about the environmental measures successfully implemented by this local community, the CrossWaste project focused on construction waste management, biodiversity protection, and planned renewable energy projects.

As digitalization is the central theme of this issue, we wanted to examine the extent to which modern technologies are present in one of the most important sectors of the domestic economy – mining. We discussed this with Ivan Janković, PhD, Assistant Minister of Mining and Energy for Geology and Mining, who introduced us to plans for the digital transformation of this sector.

We also present the newly established Data Center Association of Serbia through an interview with its Director, Jelena Pejković, and the Energy-Intensive Industry Association of Serbia in a conversation with its Director, Stanislava Simić. Their insights demonstrate how the digital age is shaping business decisions, priorities, and the long-term plans of the industry.

We are pleased that, in this issue, we also hosted young innovators – students who, alongside their academic commitments, make time to care for nature – as well as domestic talents who are achieving success in international competitions.

We hope you will enjoy the new issue of Energy Portal Magazine, which brings together digitalization, sustainability, and the people whose knowledge and vision are driving important change.

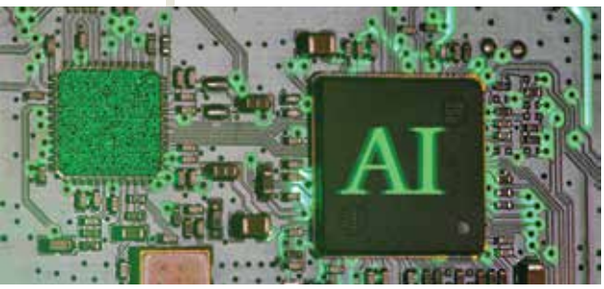
Nevena Đukić
editor-in-chief

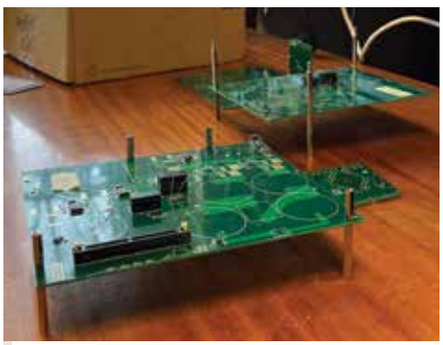
Photographs: Ivana Todorović; (cover) AdobeStock

IN THIS ISSUE...

On the rooftops of six buildings at the Pančevo Oil Refinery, representing another in a series of projects delivered by MT-KOMEX for NIS a.d. Novi Sad.

Photographs: (I row) Pixabay/Palmeris, SET Trebinje; (II row) Siemens, ABB; (III row) Unsplash/Peter Werkman, Ivan Kićanović, Charge&GO





Photographs: (I row) Unsplash/Immo Wegmann, Unsplash/Hrvoje photography; (II row) Greenfield, H-Bridges; (III row) ChatGPT Image, Geza Farkaš

VISION-LED ENERGY TRANSITION: WHAT BiH CAN LEARN FROM GREECE

Photograph: Selmir Zejnć@n

Ioanna Efthymiadou

Ambassador of Greece to Bosnia and Herzegovina

Greece ranks among Europe's frontrunners in the development of renewable energy sources, with approximately 65 percent of its energy mix generated by renewables. For this reason, the country's experience represents a valuable guideline for Bosnia and Herzegovina, which is only now entering a decisive phase of its energy transition. In an interview for our magazine, the Ambassador of Greece to Bosnia and Herzegovina, Ioanna Efthymiadou, discusses the key opportunities and challenges awaiting BiH, the mistakes that should be avoided, the importance of environmental protection, as well as the prospects for cooperation between Athens and Sarajevo in the fields of energy, environmental protection, and access to European funds.

Q: Bosnia and Herzegovina has significant potential for renewable energy sources. Based on Greece's experience, where do you see the greatest opportunities, but also the main risks for BiH in the coming years?

A: As you may know, Greece's current energy mix is comprised of approximately 65 percent Renewable Energy Sources, reflecting substantial progress in its energy transition. During his recent visit to Sarajevo, the Greek Deputy Minister of Foreign Affairs, Mr. Theoharis Theoharis, expressed Greece's readiness to support Bosnia and Herzegovina during its energy transition. This support could build upon Greece's experience in deploying renewable energy, reforming energy markets, and aligning national policies with EU energy and climate objectives.

Bosnia and Herzegovina is a significant regional electricity producer, but renewable penetration beyond hydro remains limited.

BiH and Greece share certain similarities: strong potential for renewable resources and dependence on coal. Greece's experience suggests that the greatest opportunities lie in the rapid deployment of solar and wind, where costs are low, resources are abundant, and projects can be developed relatively quickly. Like Greece, BiH could also benefit from repurposing coal regions into renewable and storage hubs, combining energy investments with job creation and retraining to support a just transition. If aligned with EU market rules, renewables could strengthen energy security, reduce exposure to carbon pricing, and establish BiH's position as a regional electricity exporter.

At the same time, slow permitting could delay projects and deter investors unless regulatory frameworks are harmonized and made predictable. Electric Grid constraints represent another major risk: without timely investment in transmission, flexibility, and storage, high shares of renewables may lead to curtailment and system instability. Finally, a poorly managed coal phase-out without care for workforce retraining could create social resistance, especially in mining regions, undermining the necessary support for the transition.

In short, BiH could draw from Greece's experience by combining clear long-term policy signals, grid modernization, and early just

Greece's current energy mix is comprised of approximately 65 percent Renewable Energy Sources, reflecting substantial progress in its energy transition

Photographs: (na prethodnoj strani) Unsplash/Constantinos Kollias; (top) courtesy of Ioanna Efthymiadou

transition planning to avoid locking the country into delays and rising economic costs as Europe accelerates its decarbonization.

Lessons learned from Greece's Renewable Energy Transition:

- Structured, predictable policy and strategic vision are essential. Greece's ambitious National Energy and Climate Plan (NECP) and strong policy frameworks have driven rapid uptake of solar and wind, with renewables increasingly dominating the electricity supply. Aligning incentives, regulations, and long-term targets builds investor confidence, which is essential for sustained private investment.
- Grid modernization and flexibility remain crucial. As Greece added renewables, it also prioritized grid reinforcement, interconnections with neighboring countries, and system flexibility tools (like storage and balancing capacity). These are vital for handling variable generation from solar and wind. Without sufficient storage and transmission upgrades, high shares of renewables can jeopardize grid stability and lead to curtailment.
- Community and decentralized energy can support inclusion. Greece is experimenting with energy communities and decentralized generation to promote participation and tackle energy poverty.
- Just transition planning is also essential. Greece has begun phasing out coal (lignite) generation while planning for social impacts on affected regions—an approach BiH could adapt for its coal-dependent areas.

Q: Greece has undergone an accelerated energy transition in a relatively short period of time. In your opinion, which mistake should Bosnia and Herzegovina avoid on this path?

A: If we could share one lesson with you, it should be this: speed should not run ahead of system readiness and social consensus. For example, renewable capacity may expand faster than the grid's nominal capacity, storage capacity, and market structure that can absorb it. The result could include curtailment, congestion, rising balancing costs, and growing local opposition, which may slow new projects and complicate planning.

Renewable build-out should not be treated as a goal per se. Instead, it should be integrated from the start with grid reinforcement, flexibility, and coordination among key stakeholders.

Photographs: (top) Unsplash/Despina Galani; (bottom) Pixabay/Palmeris

The social dimension of the coal exit should not be underestimated either. Moving too fast without concrete retraining, investment, and local ownership risks backlash that could stall the entire transition.

And finally, regulatory volatility should be avoided. It is therefore advisable to prioritize a balanced approach: develop renewables always in line with grid capacity, social awareness, and stable rules. That may appear slower, but it is far more resilient and ultimately faster in delivering a durable energy transition.

Greece can support BiH by sharing experience on transposing EU energy and environmental legislation, managing grid integration of renewables, planning transitions in coal regions, and maintaining policy stability

Q: How can Bosnia and Herzegovina develop renewable energy projects while at the same time preserving rivers, forests, and biodiversity, especially considering sensitive ecosystems?

A: Bosnia and Herzegovina's energy transition may be as much about quality as capacity. Expanding renewables while protecting nature is possible if the approach is selective, spatially aware, and institutionally robust.

For example, as you know, small projects in sensitive rivers sometimes bring limited energy benefits but significant ecological and social trade-offs. BiH might consider avoiding areas of high biodiversity or protected rivers. Spatial planning could help steer projects toward sites such as degraded land, post-industrial areas, and rooftops while minimizing impacts on forests, rivers, and migration corridors.

Environmental governance, independent assessments, and long-term monitoring support better outcomes, especially if local communities are involved and share in the benefits.

Q: How important is it for Bosnia and Herzegovina to align its energy and environmental policies with European standards, and what kind of support can Greece provide in this process?

A: Alignment with European energy and environmental standards (EU Green Deal, Fit for 55, and Energy Community obligations) is essential for BiH's energy landscape and for its economic stability. Without alignment, BiH risks losing access to regional electricity markets, facing higher costs from carbon measures, and deterring investment due to regulatory uncertainty. Carbon pricing, sustainability requirements, environmental assessments, and grid access are increasingly influencing electricity exports. Early alignment can help BiH avoid sudden shocks and maintain market access.

Greece's experience illustrates the value of stable, EU-compatible rules.

The country's renewables boom accelerated once investors trusted the legal framework, while EU environmental acquis helped shift debates from whether to build renewables towards where and how. For BiH, alignment could anchor governance, strengthen biodiversity protection, improve water management, and ensure public participation, particularly in areas with strong opposition to poorly sited projects.

Last but not least, aligning with EU environmental standards will help tackle severe air pollution, which, unfortunately, plagues many of the country's (and the region's) cities and presents a serious health hazard.

Greece can support BiH by sharing experience on transposing EU energy and environmental legislation, managing grid integration of renewables, planning transitions in coal regions, and maintaining policy stability.

Q: Do you see room for concrete cooperation between Greece and Bosnia and Herzegovina in the fields of energy, environmental protection, or the exchange of expertise?

A: There is potential for cooperation between Greece and Bosnia and Herzegovina in energy, environmental protection, and expertise exchange. Greece's experience in integrating renewables, promoting energy efficiency, and aligning with EU standards could provide valuable guidance for BiH. Collaboration may include technical assistance, peer-to-peer exchanges between ministries and regulators, academic and vocational partnerships, and joint participation in EU or regional programs. Lessons from Greece's regional-hub experience, interconnectors, market coupling, and balancing renewables could help BiH strengthen its

infrastructure, manage environmental trade-offs, and accelerate alignment with EU standards.

Moreover, Greek companies are active across the full energy value chain: renewables, grids, storage, energy efficiency, and project financing. There is substantial scope for cooperation in solar and wind projects, grid stabilization, storage solutions, and energy-efficient infrastructure, fully aligned with the European Green Deal and the connectivity priorities of the Western Balkans Investment Framework.

Q: Greece has experience in using European funds for green projects. Which financing mechanisms or models could Bosnia and Herzegovina prioritize first?

A: Drawing on Greece's experience with EU funds, simple, scalable mechanisms that are quick to absorb are often more effective than complex schemes requiring high administrative capacity from the outset.

Blended finance—combining EU grants with loans from institutions like the EIB or EBRD—can reduce investment risk and mobilize private capital for renewables, grid upgrades, and energy efficiency. In parallel, early focus on energy efficiency in public buildings, hospitals, schools, and municipalities offers small, replicable, and politically visible wins that deliver fast economic and social benefits. These projects build credibility, demonstrate impact, and help secure continued funding. For renewables, simple competitive auctions tend to outperform ad-hoc support schemes. Early investment in project preparation, particularly in coal regions, is also important. Readiness pipelines for renewables, storage, reskilling, and SME support ensure that future EU or regional transition funds can be absorbed efficiently.

Greece's experience suggests that combining grants, concessional loans, and well-prepared projects builds early momentum and public confidence. For BiH, prioritizing blended finance, visible public-sector projects, straightforward auctions, and robust project pipelines could provide the fastest path to credible, bankable results.

Q: How can regional cooperation in the Western Balkans help Bosnia and Herzegovina strengthen energy security and develop renewable energy sources?

A: Shared electricity markets, cross-border interconnectors, and coordinated grid management reduce dependence on single suppliers and make the system more resilient to shortages or price shocks. The Energy Community Treaty, for example, seeks to create an integrated regional market aligned with EU standards, improving cross-border trade and overall energy security.

Cooperation also makes integrating renewables easier. Cross-border power trading can help balance variable energy sources such as wind and solar, lowering costs and easing grid management. Programs such as the Regional Energy Efficiency Programme have mobilized over €1 billion for public building upgrades, clean energy installations, and policy reforms. In contrast, EU energy support packages provide grants and budget support that improve investment conditions.

Standardized market rules make it simpler for producers in one country, whether solar or wind, to sell power across borders. Cooperation allows the exchange of technical expertise and best practices in renewable deployment and grid modernization.

Greece's experience illustrates the benefits: interconnections and regional electricity trade can reduce

Photograph: Unsplash/Karsten Wurth

price volatility and improve supply stability.

Q: What message would you send to institutions and investors in Bosnia and Herzegovina regarding sustainable development and the energy transition?

A: During the energy transition interim period, countries face the dual challenge of maintaining security of supply while gradually reducing reliance on high-carbon (and high-polluting) energy sources. In this context, natural gas is widely recognised as a transitional fuel, enabling system stability, fuel switching away from coal, and the integration of higher shares of renewable energy.

In this regard, integrating Bosnia and Herzegovina more closely into broader transnational energy corridors enhances resilience, reduces dependence on single suppliers, and strengthens Southeast Europe's overall strategic autonomy.

The Vertical Energy Corridor, extending from Greece through the Eastern Balkans toward Ukraine, may therefore become important to BiH, given the possibility to connect the Corridor to the Western Balkans supply system as well. Anchored in Greek LNG infrastructure (notably terminals in Revithoussa and Alexandroupolis), the corridor enables diversified gas supply routes into Southeast, Eastern, and Central Europe, strengthening diversification, reducing supply dependence on single suppliers, and enhancing regional resilience.

The Vertical Gas Corridor is a regional initiative enabling the transport of LNG-based natural gas from Greece northward to Ukraine via interconnected gas networks in Southeast and Central Europe. It is anchored in Greek LNG terminals (Revithoussa and Alexandroupolis) and uses existing infrastructure with targeted upgrades. Memoranda of Understanding have been signed between the gas transmission operators and the authorities of participating countries (Greece, Bulgaria, Romania, Hungary, Slovakia, Moldova, and Ukraine) to coordinate capacity expansion, reverse flows, and system operation. The corridor is built on cooperation between the national gas transmission system operators of these countries, enabling north–south gas flows from Greek LNG entry points toward Central Europe and Ukraine. The MoUs support diversification of supply, enhanced energy security, and regional market integration during the energy transition period. The purpose is to provide a secure transitional gas supply while countries scale up renewable energy and phase out coal.

For BiH, the corridor could offer:

- Improved energy security through access to diversified LNG supplies via regional interconnections.
- Support during the transition phase, allowing a gradual coal phase-down while renewables and grid capacity are scaled up.
- Regional integration, strengthening links with EU energy markets, and aligning with European energy security objectives.

More broadly, the Vertical Corridor reinforces Greece's role as a regional energy gateway and underpins its stated willingness to support partner countries, including BiH, with access to infrastructure, technical expertise, and policy experience during the transition to a low-carbon energy environment. In sum, the corridor is a complementary strategic tool that facilitates a secure, orderly, and economically viable energy transition in Southeast Europe and the Balkan area.

Interview by Jasna Dragojević

Photograph: Unsplash/Miltiadis Fragkidis

HOW DIGITALIZATION IS TRANSFORMING THE MANAGEMENT OF MINERAL RESOURCES IN SERBIA

Demand for mineral raw materials that drive the energy transition is growing, and with it, the need for more precise, efficient, and responsible resource management. In this process, digitalization is becoming a key tool—not only for modernizing the mining industry, but also for creating a safer, more transparent, and more sustainable system. We spoke with Ivan Janković, PhD, Assistant Minister of Mining and Energy for Geology and Mining, about what digital solutions bring to Serbia, the results already visible, and what mining will look like in the coming years.

Q: Digitalization is often cited as one of the key pillars of the energy transition. What specific role can smart digital solutions play in improving

In the mining sector, smart digital solutions enable more accurate management of data related to geological exploration, resources, and reserves

Photograph: Pixabay/Milan975

Serbia's mining sector, particularly in managing mineral resources critical to the energy transition?

A: Digitalization is regarded as one of the key pillars of the energy transition because it enables data-driven decision-making, more efficient resource management, and greater control over complex systems. In the context of increased demand for mineral raw materials—primarily those essential for the energy transition—digital solutions provide the foundation for rational, responsible, and sustainable resource use.

In the mining sector, smart digital solutions enable more accurate management of data related to geological exploration, resources, and reserves, improved planning of extraction activities, and continuous monitoring of approved operations. This translates into higher-quality planning, reduced operational risks, and greater efficiency per unit of extracted raw material, which is particularly important for mineral resources critical to the energy transition.

At the same time, digitalization enhances transparency and strengthens oversight of extraction activities, as well as improves monitoring of environmental impacts and the implementation of protection measures. The combination of reliable data, efficient management, and increased accountability ensures that mining in Serbia can serve as a stable, reliable pillar of the energy transition while respecting the principles of sustainable development.

Q: How can digital technologies contribute to increasing energy efficiency in industry, the business sector, and mining, as well as in households? Where do you currently see the greatest untapped potential?

A: Digital technologies enable energy efficiency to be based on precise measurement and active consumption management. In industry, the business sector, and mining, this involves improved monitoring of energy flows, optimization of equipment operating regimes, and enhancement of maintenance practices, thereby reducing losses and unplanned downtime. In mining in particular, as an energy-intensive activity, digital solutions enable better control of energy consumption per unit of output, more efficient equipment utilization, and improvements in mineral processing operations.

In households, digitalization contributes to greater awareness and enables better understanding and more rational management of energy consumption. The greatest untapped potential currently lies in the broader application of these approaches and their integration across different levels of consumption—from large industrial and mining systems to end users. Integrated consumption management can deliver rapid and measurable effects in terms of energy savings and reduced system load.

Ivan Janković, **PhD**
Assistant Minister of Mining and Energy for Geology and Mining

Q: Which digital technologies and tools have already been implemented in Serbia's mining and energy sectors, and what results have been achieved so far?

A: In Serbia, digital solutions are already being applied to a significant extent in data management, process monitoring, and decision-support systems within the mining and energy sectors. In mining, the focus has been on improving information systems that enable systematic management of geological data, resources, and reserves, as well as spatial analyses and activity planning, including the digitalization of certain stages of mineral extraction.

In the energy sector, digitalization encompasses enhancing data management systems for electricity generation, transmission, distribution, and consumption, as well as

Photographs: (left) Unsplash/Badibanga Roger; (top right) courtesy of Ivan Janković

developing control centers for distribution and transmission systems and for power generation. This has contributed to improved process control, more reliable planning, and greater operational security.

Within the mining sector specifically, significant progress has been achieved through the development of integrated information platforms in geology and mining. These platforms enable digital archiving of data, management of records related to exploration and exploitation fields, monitoring of mining waste, and electronic submission of reports and data by permit holders.

At the same time, the Ministry of Mining and Energy has developed the Energy Portal as a unified digital platform for electronic submission of applications, case processing, and administrative procedures, featuring a centralized database and a high level of data security. The implementation of this system will significantly accelerate and simplify administrative procedures, increase transparency, and enhance data protection and accessibility. Overall, it will contribute to more efficient sector management and the transition toward a decision-making model based on reliable, interconnected, and easily accessible information.

Q: How do you assess the cooperation between the Ministry of Mining and Energy and domestic scientific, research, and educational institutions in the field of energy digitalization? Are there any projects or initiatives you would highlight as examples of good practice?

A: We consider the cooperation between the Ministry of Mining and Energy and domestic scientific, research, and educational institutions to be an important and indispensable element of digitalizing the mining and energy sectors. Collaboration with institutions that possess specialized expertise and long-standing experience in geology, mining, and the application of digital technologies is particularly significant, as digitalization in these sectors is not only a technological issue, but also a systemic and human resources matter.

By its very nature, digitalization requires a regulatory framework that is flexible and capable of keeping pace with rapid technological developments, which is particularly evident in the mining and energy sectors

As an example of good practice, I would highlight joint projects with the Faculty of Mining and Geology and the Geological Survey of Serbia that have contributed to the development of national information systems and digital databases in geology and mining. Such initiatives provide a strong foundation for further upgrading existing systems in line with modern technological advancements, as well as for strengthening institutional and human resource capacities through future joint projects, research, and training programs. The objective is to advance digitalization by leveraging domestic knowledge and expertise, while establishing a sustainable framework for long-term implementation and continuous improvement of digital solutions in the sector.

Q: Digitalization also implies changes in regulation and system governance. Is the existing regulatory framework in Serbia sufficiently flexible to keep pace with the rapid development of smart energy technologies, or are additional reforms needed?

A: By its very nature, digitalization requires a regulatory framework that is flexible and capable of keeping pace with rapid technological developments, which is particularly evident in the mining and energy sectors. The current regulatory framework in Serbia provides a foundation for implementing digital solutions; however, the pace of technological advancement necessitates its continuous adjustment and improvement.

In the mining sector, this approach has already been recognized in the Strategy for the Management of Mineral and Other Geological Resources, which is currently being adopted by the National Assembly of the Republic of Serbia. The Strategy identifies digitalization as a key tool for improving resource management, transparency, and system efficiency. In addition, new legislation in

Photograph: Unsplash/Omid Roshan

this field is currently being drafted, with particular emphasis on provisions related to electronic business operations, digitalization of administrative procedures, and the creation of conditions for the adoption of by-laws and rulebooks that will fully support the implementation of modern, or smart, technologies.

Q: Where do you see Serbia in five years in terms of the digital transformation of the mining sector, particularly in the management of mineral resources important for the energy transition? What would be the key indicators of success during that period?

A: In the coming years, I see Serbia as a country where the digital transformation of the mining sector has become an integral part of mineral resource management—especially those resources critical to the energy transition—as well as of production processes themselves, supported by a high degree of digital system integration and electronic business operations.

Within this framework, Serbia has the potential to position itself as one of the regional leaders in the application of advanced digital solutions in geology and mining, with practices comparable to contemporary European standards. Digital solutions will enable the integration of data from geological exploration, through planning and extraction, to environmental impact monitoring, significantly improving the quality of decision-making and long-term resource management.

Key indicators of success during this period will include a higher level of implementation of digital technologies in planning, exploration, and mineral extraction activities, including the use of advanced analytics and artificial intelligence, as well as visible improvements in efficiency, safety, and production sustainability. At the same time, success will also be measured by the system's ability to support digital transformation within production processes, alongside strengthened human resource capacities and alignment with European standards and best practices in mineral resource management.

Q: One of the challenges of digitalization concerns human resources, cybersecurity, and public trust in new technologies. How should these challenges be addressed to ensure that digital energy solutions are both secure and widely accepted?

A: Challenges related to workforce capacity, cybersecurity, and public trust are integral to digital transformation in the sector. Addressing them requires strengthening professional capacities through continuous training and cooperation with educational institutions, as well as integrating high cybersecurity and data protection standards into all phases of the development and implementation of digital solutions.

Public trust is built through transparency, system reliability, and clearly demonstrated benefits of digitalization. In this way, digital energy solutions can be both secure and broadly accepted.

Interview by Milena Maglovski

Photographs: Ministry of Mining and Energy of the Republic of Serbia

RECYCLING AND RAISING ENVIRONMENTAL AWARENESS IN THE MUNICIPALITY OF BROD

The Municipality of Brod is working intensively to improve waste management, focusing on recycling construction materials, remediation of the municipal landfill, and public education—thereby contributing to a greener transition. We spoke with Milan Zečević, Mayor of the Municipality of Brod, about the main challenges in this process and the advantages this local community possesses.

Q: The Municipality of Brod is actively improving construction waste management through the CrossWaste project. Could you tell us more about the objectives of this project?

A: As a border local community, the Municipality of Brod fits within the eligibility requirements of numerous public calls under IPA policies. Accordingly, we applied for one of the calls published for 2023/2024, together with the Municipality of Borovo, as the call required one municipality from within the EU and one from outside the EU.

Throughout the year, we therefore carry out various maintenance works on the canal network, as well as cleaning of the Sava riverbank, and continuous activities aimed at preventing the creation of illegal dumpsites

Photograph: Selmir E Žepč@n

The CrossWaste project focuses on the management of construction waste, primarily generated through the removal of deteriorated and derelict buildings within our municipality. The project includes the preparation of several supporting documents, training activities, and awareness campaigns targeting our youngest population with regard to environmental protection and raising ecological awareness among our citizens.

The main component of the project involves the procurement of specialized machinery (a crusher) to process the aforementioned construction material and convert it into aggregate suitable for the rehabilitation of unclassified and gravel roads in the Municipality of Brod. In other words, this process is conceived as part of a recycling cycle in which waste is transformed into a sustainable and useful material.

In the long term, we believe that the project's greatest impact will not lie solely in acquiring the crusher but in fostering a stronger sense of environmental responsibility among our citizens as part of the broader vision of a greener transition for our local community.

Q: Where does the development of the Local Environmental Action Plan (LEAP) currently stand, and what did the survey you conducted reveal?

A: Within the framework of the CrossWaste project, the Municipality of Brod developed the LEAP, which involved assessing all environmental capacities, existing realities, threats, and development opportunities that our municipality can offer in the implementation of new environmental standards.

Our idea is to integrate a more developed environmental awareness throughout the entire municipality. However, this unfortunately requires continuity, as well as political, social, and community partners who will consistently implement, improve, and pass on these efforts to future generations.

The survey results indicate that the public in Brod demonstrates a relatively high level of awareness regarding environmental issues. The main concerns relate to illegal dumping sites, water quality, and flood risks. At the same time, citizens proposed concrete measures—from education and improved organization to strengthening waste management systems and enhancing institutional accountability.

The remediation of the municipal landfill is certainly one of the biggest challenges our local community is facing

Milan Zečević
Mayor of the Municipality of Brod

Q: Could you clarify the current status of works at the municipal landfill, the planned environmental protection measures, and the timeline for completing the remediation?

A: The remediation of the municipal landfill is certainly one of the biggest challenges our local community is facing, not only in terms of environmental protection but also in terms of efficient disposal of newly generated waste. At the landfill site, waste

Photographs: owned by the Municipality of Brod

has been disposed of improperly, and without planning for a long period of time, we believe for over 30 years, which is, after all, also the case in other local communities in Bosnia and Herzegovina. Therefore, this issue is among the most urgent, requiring not only a temporary solution but also a planned, systematic approach.

The fire that broke out at the landfill, thanks to the great effort and coordination of all competent services, remained under control, but it also served as a unique opportunity for all of us to understand how important the issue of municipal waste disposal truly is.

The analysis we conducted by reviewing the operations of the unit of the municipal company responsible for waste collection and disposal, as well as the surveys we carried out, showed that over the past 10 years, the amount of waste we produce has drastically increased, which further supports the thesis that we are becoming an increasingly consumer-oriented society.

For example, over the past 10 years, the Municipality of Brod has experienced a significant population outflow. Still, despite a reduction in the number of municipal service users, there has been a considerable increase in the gross mass of waste. One of the biggest problems is certainly the process of selecting and separating mixed municipal waste, and we believe that the first step, which we are currently working on, is selecting and separating PET packaging, which accounts for the largest share of the volume of newly generated waste.

Last year, the Municipality of Brod allocated substantial funds to support our farmers, stimulating all branches of agriculture—from dairy production, crop farming, and livestock breeding to beekeeping, etc

At present, the municipal landfill is implementing the second phase of remediation. The first phase included extinguishing the fire and introducing order into the waste disposal process so that we would not again reach a stage of uncontrolled landfill growth. A significant part of the access roads to the landfill has been completed, a regular gate control service has been introduced, and video surveillance has been installed, all to secure and regulate citizens' access to this area.

The construction of internal roads within the landfill is currently underway. By the end of this year, we

Photographs: (middle left and bottom) owned by the Municipality of Brod; (middle right) Pixabay/Petar Ubiparip

plan to significantly intensify activities related to the separation of PET packaging from other types of waste.

Q: How does the Municipality of Brod approach biodiversity conservation and the protection of the Sava and Ukrina rivers?

A: The Municipality of Brod has around 55 kilometers of the Sava riverbank, more than 150 kilometers of internal canal network, 11 kilometers of the Ukrina River, as well as nearly 700 hectares of standing water surfaces, which represents a major task for a small local community. The responsibility of the municipal administration, in cooperation with the Public Institution "Vode Srpske," is to ensure that the territory of our municipality, which is otherwise a flood-risk area, is properly maintained, primarily for flood prevention purposes.

Throughout the year, we therefore carry out various maintenance works on the canal network, as well as cleaning of the Sava riverbank, and continuous activities aimed at preventing the creation of illegal dumpsites that could threaten the biodiversity of our waters. The Municipal Assembly of Brod adopted a Decision banning the harvesting of the water bloom to protect this phenomenon during the so-called blooming period of the Ukrina. In addition, in cooperation with the Sport Fishing Association, we carry out activities related to the maintenance of fishing trails along the Sava riverbank. Over the past 7–8 years, we have observed the return of certain species of Sava water bloom and water lilies to our waters, and, together with the appearance of beavers, this indicates that the Sava River is cleaner and healthier than before.

Q: Are there any projects planned related to renewable energy sources?

A: There are certain projects that we intend to implement and realize in the coming period. In our competent municipal departments, we are receiving an increasing number of requests for the installation of solar power plants. This development has both long-term and short-term advantages and disadvantages. I believe it is necessary that, together with the Government of the Republic of Srpska, through cooperation with local administrations, we initiate as soon as possible the process of jointly developing strategies that would more clearly define the methods, vision, and rules for acting in this area. I am concerned that we are currently in a phase of expanding this idea, which requires different regulations and, certainly, a long-term plan, as this issue exceeds the capacities of local administrations and affects the overall energy strategy of the Republic of Srpska.

Thanks to its significant water resources, the Municipality of Brod has opportunities to construct reversible (pumped-storage) hydropower plants, which are the most environmentally acceptable renewable energy source. In 2025, we conducted consultations and discussions on this topic, and we plan to arrange geo-hydrological studies in the near future.

Q: Have there been any projects related to energy efficiency in public buildings?

A: In 2026, the Municipality of Brod

Photograph: Selmir E Žepč@n

always carries the risk that those six percent of the territory may be flooded. Thanks to the extensive and widespread canal network, there are numerous opportunities to develop irrigation systems, and this should receive significant attention.

Last year, the Municipality of Brod allocated substantial funds to support our farmers, stimulating all branches of agriculture—from dairy production, crop farming, and livestock breeding to beekeeping, etc. This year, we have increased the allocated funds by 25 percent compared to last year, and part of the funds will, for the first time, be directed toward capital investments in the

The CrossWaste project focuses on the management of construction waste, primarily generated through the removal of deteriorated and derelict buildings within our municipality

plans to implement several projects related to energy efficiency, which we consider to be among the priorities of the public administration. This year, we plan to replace the windows and doors and carry out thermal insulation façade works on the municipal administration building.

In February, we will announce a tender to select a contractor for the energy-efficiency project for the kindergarten building, which includes roof replacement, replacement of external joinery, thermal insulation, façade works, installation of a heat pump, and the transition of the entire kindergarten lighting system to low-emission LED bulbs. We hope that this year we will also begin works on the energy efficiency project for the old court building.

Q: How does the Municipality of Brod plan to utilize agricultural land and water resources to improve local agriculture?

A: The Municipality of Brod has some of the most fertile agricultural land, as it is located in the Sava River basin, and agricultural production has long significantly shaped the character of the town. Around six percent of the municipality's territory lies within two controlled flood retention areas, which represent both an opportunity and a risk for our farmers.

It is difficult to predict the annual water level of the Sava River, which

construction of dryers and silos and the drilling of wells.

It is important to note that all registered agricultural producers have the right to apply for both components of the call. There is an established schedule for the disbursement of these funds, and it is very important that we adhere to this schedule so that all our farmers can rely on the payment of these funds at the prescribed times.

Additionally, one of the continuous tasks is resolving property and legal issues related to land ownership to make as many parcels as possible available to interested agricultural producers.

Interview by Jasna Dragojević

Photographs: ownership of the Municipality of Brod

VOLVO

Heavy trucks of today are sophisticated vehicles filled with advanced software systems, similar to those in passenger cars. Connectivity is at the core of this development. More than one million connected Volvo trucks are now on the road worldwide and can make use of the company's full range of services.

Volvo Connect

Volvo Trucks. Driving Progress

SET TREBINJE 2026: AI DRIVES AND SHAPES THE REGION'S ENERGY TRANSITION

The Energy Summit Trebinje 2026, to be held from 25 to 27 March at the Cultural Centre Trebinje, will once again bring together the most important stakeholders from the region and across Europe to jointly define the future directions of energy sector development. With a clear focus on the energy transition, digitalization, system stability, and the application of artificial intelligence, this year's edition promises to be more comprehensive and ambitious than ever before. We spoke with Aleksandar Branković, Director of the Energy Summit Trebinje, about what participants can expect, how conclusions from the previous summit shaped this year's program, and which strategic topics will dominate.

Q: What are your key expectations for the Energy Summit Trebinje 2026, and which goals do you want this event to achieve in the context of current energy challenges in the region?

A: We expect the Energy Summit Trebinje 2026 to represent a strong step forward compared to previous editions—in terms of content, the number of relevant participants, and the concrete outcomes we aim to achieve. Our goal is for the Summit to confirm once again its role as

Photograph: SET Trebinje

the central regional meeting point for the energy sector and, through open and expert dialogue, to offer clear directions for action at a time of major energy challenges.

We aim not to limit the Summit to an exchange of opinions, but to reach practical conclusions and concrete solutions in the areas of energy transition, security of supply, renewable energy development, and the improvement of market and regulatory frameworks. We want the Summit to generate new partnerships, strengthen existing ones, initiate projects and initiatives, and ensure that their real impact remains visible long after this regional gathering has concluded.

Q: What can participants expect from SET Trebinje 2026?

A: Participants already know that each year they can expect top-tier scientific and professional content—and SET 2026 will be no exception. The program will include panel discussions, presentations of innovations, and topical issues such as the energy transition, renewable energy sources, the application of artificial intelligence in grid management, market models, and diversification of generation sources. There will be opportunities for idea exchange, project presentations, and business meetings with investors and decision-makers from the region and beyond.

Q: How do you assess the experience from SET Trebinje 2025, and how did the conclusions from the previous summit influence the program of this year's edition?

A: We have already seen a significant impact from the conclusions of SET 2025—ranging from electricity trading and climate-related challenges to the implications of the CBAM levy and regulatory models. For this reason, we have given priority to topics that directly address operational and strategic solutions for the energy transformation, rather than limiting the discussion to high-level overviews.

Q: Which profiles of participants and speakers do you expect this year, and from which countries will guests be coming?

A: SET 2026 positions Trebinje as a meeting place for the most important stakeholders. We expect eminent experts from the energy sector, representatives of governments and regulatory bodies, executives of power utilities and energy companies, investors, technology partners, and academic authors. Guests will be arriving from the Western Balkans, European Union member states, and beyond, as these challenges transcend borders and require international cooperation.

Q: In previous years, SET Trebinje has been recognized as a regional energy hub where key trends and plans for the coming period are presented. Do you expect the Summit to maintain this role this year, and which strategic topics will be in focus?

Aleksandar Branković
Director of the Energy Summit Trebinje

A: Absolutely. I expect the Summit not only to maintain this role, but to strengthen it further. SET Trebinje has already been established as a forum where policymakers, professionals, investors, and energy companies come together to open up the most important development issues in the sector. This year, the focus will once again be on strategic issues: the energy transition, integration of renewable energy sources, system stability and flexibility, energy storage, digitalization, and new market models.

We are placing special emphasis on advanced technologies and artificial intelligence, as reflected in this year's slogan, "AI Drives and Shapes the Region's Energy Transition." It is clear that the adoption of advanced digital solutions and artificial intelligence is becoming a key driver of change in the energy sector. That is precisely why the Summit remains a place where discussions go beyond trends and focus on their practical implementation.

Interview by Milena Maglovski

Photographs: (bottom) SET Trebinje; (top) courtesy of Aleksandar Branković

SIEMENS

A RELIABLE PARTNER IN THE DIGITALIZATION OF THE ENERGY SECTOR

Given the pioneering implementation of Process Bus technology, the SS 400/110 kV Bor 6 has become a reference for a technological breakthrough in the domestic power system and a model for a new approach to management and monitoring.

The project was implemented through the joint efforts of the Siemens Smart Infrastructure team in Serbia and experts from the Elektromreža Srbije (EMS) team, with the goal of establishing a solid foundation for next-generation digitized substations.

Unlike traditional plants, where analog signals travel through hundreds of meters of copper cables, in SS Bor 6 digitized measurements are transmitted **exclusively by optical communication**. This reduces the demand for cables, accelerates information processing, and ensures greater reliability of the entire system.

The Merging Unit plays a key **role**, collecting analog values from conventional transformers and converting them into Sampled Values.

Photographs: Siemens

The data provided is then distributed to protection and control devices via the Ethernet network. This architecture enables faster testing, simpler diagnostics, and greater flexibility in substation operations, particularly for future upgrades and expansions.

The successful application of the innovative technology is supported by prior experience gained on the **SS Belgrade 3**, where optical measuring transformers were used for the first time in Serbia. This project played a significant role in transferring practical knowledge about the integration of optical measurement systems into existing protection architecture, as well as about Process Bus technology. The difference between the two projects is reflected in their scope and complexity: while Belgrade 3 was a prelude, Bor 6 is the first fully digital structure in practice.

Reduced maintenance costs, a higher level of data availability, and easier integration of new technologies make Process Bus the right solution, tailored to current needs for further development of the electricity transmission network

During the execution of the works, a special challenge was the implementation **of the SIPROTEC 5 Merging Unit device** and the establishment of a redundant communication network based on **the PRP protocol**. The goal was to synchronize the operation of all components without interruption while synchronizing multiple data sources simultaneously. Despite the complexity, the project was completed **three months ahead of schedule**, which is the result of the coordinated work of teams on the ground and detailed preparations during the testing phase.

FAT tests conducted at the request of EMS simulated a whole range of operating scenarios – from standard conditions to failures and extreme loads – with the aim of confirming the stability and responsiveness of the system in real operation. The results showed that the process bus structure provides a high level of reliability, especially in situations requiring immediate measurement validation and rapid protective action.

With the introduction of this solution, SS Bor 6 has become a reference project for future digital substations in Serbia. Reduced maintenance costs, a higher level of data availability, and easier integration of new technologies make Process Bus the right solution, tailored to current needs for further development of the electricity transmission network.

Milorad Jovičić, Sales Manager at Siemens Serbia, Smart Infrastructure Division, notes that this project represents an important milestone: by implementing the Process Bus System in Bor, we have demonstrated that domestic teams can deliver the most demanding technological projects. This experience opens up space for more advanced digitalization of substations in the coming years.

Siemens

DATA CENTERS AS THE FOUNDATION OF SERBIA'S DIGITAL AND ENERGY TRANSITION

At a time when digital transformation, artificial intelligence, and the energy transition are increasingly shaping economic development, the data center sector in Serbia is gaining its institutional foundation. The recently established Data Center Association of Serbia (DCAS) aims to bring together key stakeholders in this growing ecosystem, articulate shared industry positions, and serve as a relevant counterpart to the state, regulators, and international partners.

The Association was founded by Jelena Pejković of Schneider Electric, Miloš Smiljanić of Enel Data Center Solutions, Danilo Savić of Data Cloud Technology d.o.o., and Slobodan Aleksić of Rittal, with the intention of jointly contributing to the development of sustainable, competitive, and technologically advanced digital infrastructure in Serbia. We spoke with Jelena Pejković, Director of the Data Center Association of Serbia, about the Association's strategic goals in the coming period, the transition from the era of traditional data centers to

A traditional data center is primarily infrastructure designed to reliably store, process, and deliver data. It is the "engine" of digital services, optimized for stability, efficiency, and uninterrupted operation

Photograph: Tung Lam/Pixabay

so-called AI factories, and the key challenges ahead—from energy and regulation to workforce and sustainability.

Q: The Data Center Association of Serbia has only recently been established. What was the key motivation behind its founding, and which challenges or market needs indicated that such an association is now necessary in Serbia?

A: The Data Center Association of Serbia (DCAS) was established in response to the accelerated digitalization of the economy and society, the growing reliance on digital services, and the need for the data center sector in Serbia to be systematically represented and advocated for vis-à-vis

institutions, the market, and international partners. DCAS was founded as a nonprofit professional association that brings together companies and experts in the field, with a mission to promote the development of digital infrastructure, best practices, and standards, and to educate decision-makers and the wider public about the importance of data centers to the economy and data sovereignty.

One of DCAS's key roles is to represent the interests of its members before public institutions and regulatory bodies, as well as potential investors. Through joint work on regulatory proposals, standards, and legislative frameworks, members have the opportunity to influence the creation of a favorable business environment for the data center sector. A collective voice through the Association has far greater impact than individual initiatives, and DCAS provides a platform for dialogue with all relevant stakeholders.

Q: What are the Association's key strategic goals in the coming years, and how do you plan to contribute to the development of the data center industry in Serbia?

A: Our Statute defines several clear pillars, but I believe the number of goals will grow, as we expect new ideas and insights from all future members. DCAS will articulate shared industry positions in the development of legislative and regulatory frameworks—covering energy, sustainability, security, and standards—and serve as a single point of cooperation with the state. Furthermore, DCAS will serve as a platform for member collaboration and knowledge exchange, provide opportunities to work on joint projects, and offer visibility and space to identify new business opportunities,

Jelena Pejković

Director of the Data Center Association of Serbia

without engaging in direct commercial activities.

Through professional conferences, workshops, and cooperation with academic institutions, DCAS will accelerate the formation of a local talent pool for this rapidly growing market segment. One of the goals is to position Serbia and the local market internationally through participation in global events and to attract foreign investors.

Q: There is increasing discussion about the transition from the era of traditional data centers to the era of so-called AI factories. What is the fundamental difference between these two concepts, and where does Serbia currently stand in this process?

A: Today, we increasingly speak about the shift from traditional data centers to so-called AI factories, and this difference goes far beyond a mere technological upgrade. A traditional data center is primarily infrastructure designed to reliably store, process, and deliver data. It is the "engine" of digital services, optimized for stability, efficiency, and uninterrupted operation.

Photographs: (left) Unsplash/Alexandre Viard; (right top) courtesy of Jelena Pejković

An AI factory, however, functions as a next-generation production facility. Viewed through an economic lens, its inputs are energy and computing power—most often in the form of advanced GPU/TPU accelerators—while its outputs are tokens, the basic units of artificial intelligence, representing the concrete intelligence and value generated by the system. This is the point at which a facility ceases to be merely infrastructure and becomes an active producer of intelligence, with fundamentally different requirements for power density, cooling, network throughput, and operational design.

Serbia is currently in an early transition phase. We have a solid base of traditional data centers and the first significant state-owned and commercial capacities, but we are only at the beginning of building infrastructure capable of supporting high AI densities, advanced liquid cooling, and high-performance network architectures. What is important, however, is that there is clear awareness, interest, and momentum—both within the industry and the public sector—to understand, plan, and support this transition.

For this reason, DCAS will focus intensively on this topic. This transformation—from data storage to the production of intelligence—will be one of the most important technological shifts of the coming decade, and we want Serbia to be an active participant, not a passive observer.

Q: Who are the members of the Data Center Association of Serbia—are they exclusively data center operators, or do they also include companies from related sectors such as energy, IT, and telecommunications?

A: In similar associations across Europe and the region, the primary stakeholders are first and foremost data center owners and operators. They naturally have the strongest interest in having clear regulation, transparent and streamlined processes, accessible grid connections, and a well-trained workforce. However, DCAS membership is not limited to data center operators alone. The idea is for the Association to also bring together companies from related sectors—including energy, IT, telecommunications, construction, and design—as well as the academic community and individual experts.

Our goal is for DCAS to serve as a platform where companies from various supporting sectors—such as banks, investment funds, and insurance companies—can both gain education and achieve their business objectives through networking. Membership is structured (full members, associate members, and honorary members), with clearly defined annual membership fees and a publicly available membership policy.

Q: What are currently the biggest barriers to the development of data centers in Serbia—energy, regulation, infrastructure, workforce, or something else?

A: As in EU countries, limited availability of grid connection capacity and longer lead times for new capacities represent the primary constraints, particularly for AI-dense and multi-megawatt requirements. The implementation of the revised EU Energy Efficiency Directive (EED) introduces reporting obligations for key performance indicators (KPIs)—such as PUE, WUE, renewable energy share, and waste heat utilization—for facilities above 500 kW, along with expectations of increased transparency and standardization, and potential impacts on permitting procedures. DCAS sees its role in preparing its members to meet these requirements.

It is also important to note that the price and structure of electricity supply directly affect sustainability and total cost of ownership (TCO). Serbia currently has a predominantly fossil-based energy mix, alongside a growing share of renewables, which requires smart planning of power purchase agreements (PPAs) and continuous attention to efficiency.

As the market grows, Serbia will inevitably face the need for continuous workforce reskilling across various profiles—electrical engineers, HVAC

Photograph: AdobeStock

Q: The Association participated in the DCE Conference in Budapest. What were your experiences from this event, and which key messages or trends did you bring back from the conference?

A: DCAS attended Data Center Event 2025 at Hungexpo in Budapest, a regional event that brought together leading players in infrastructure, technology, and operations. We have already accepted the invitation for our Association to participate in the next event, scheduled for September 2026, where we will also deliver a presentation.

Key messages highlighted:

- **Power is the new real estate:** Grid connection lead times are long, capacity must be planned well in advance—this is a reality observed even in major European hubs.

and thermal engineers, refrigeration technicians, network specialists, and cybersecurity experts—in line with emerging AI trends. Finally, and no less importantly, we are discussing a sector that is growing exponentially, alongside supporting technologies that are evolving at an extraordinary pace. For this reason, we believe that a major focus of the Association's activities will be on education, experience sharing among members, and cooperation with peer associations across the region.

- **AI densities require liquid cooling, modularity**, and the use of digital twins; data center operators are introducing sovereign AI zones, high-throughput architectures, and low-latency networks.
- **ESG / EED**: Greater transparency of KPIs and waste heat recovery are becoming the standard rather than an option.

For us, it was particularly valuable to connect with the regional ecosystem, exchange experiences, and bring practical lessons back to our members: plan capacity early, design with higher densities in mind, measure everything, and communicate transparently.

Q: How does the Data Center Association of Serbia see its role in connecting the state, the private sector, and international partners, particularly in the context of digital transformation, artificial intelligence, and the energy transition?

A: DCAS aims to become a key reference point for the entire data center ecosystem in Serbia—a clear and strong voice representing industry needs before the state and public institutions, while at the same time building a recognizable and stable position for the sector within the country.

To the state, we bring a unified industry voice and regulatory proposals on EED implementation, permitting processes, and energy infrastructure planning. In the era of digital transformation, AI, and the energy transition, DCAS helps ensure that Serbia not only keeps pace but catches up—through smart capacity planning, responsible construction, and workforce development. One of our goals is also to place Serbia on the map as a potential destination for new foreign investments.

Towards the private sector, we are building a platform for cooperation, education, and knowledge exchange. Our objective is for all data centers in Serbia to achieve high levels of energy sustainability, and for companies operating in this segment to be highly skilled and regionally recognized.

We actively engage with regional conferences and initiatives, transfer key trends—from power supply and cooling to digital twins and new efficiency and sustainability regulations—and, through membership, facilitate investment and technological cooperation.

Interview by Milena Maglovski

Photograph: AdobeStock

DIGITAL ENERGY MANAGEMENT IN HOTELS – THE ROLE OF THE ABB KNX SYSTEM

Digitalization in the building sector today represents one of the key tools for reducing energy consumption and achieving climate targets. Hotel facilities, which operate 24 hours a day and consume high amounts of energy per room, present a particularly challenging environment. For this reason, smart automation systems, such as the global KNX standard, are becoming an important part of energy-efficiency and sustainable building management strategies.

One of the most representative examples is the **Geneva Marriott Hotel**—a facility in which KNX has become the "silent conductor" of the entire environment. Across 263 rooms, more than 1,500 luminaires and as many as 4,500 power outlets are connected into a single smart network that responds to guest presence, time of day, and desired comfort level. Guests enjoy personalized scenes such as *welcome*, *sleep*, or *do not disturb*, while lighting, climate control, and blinds automatically adjust to the needs. The result is a perfect harmony between aesthetics and technology—an experience that is felt, not seen.

ABB KNX demonstrably delivers 20–40 percent energy savings, representing a significant savings in hotels with a large number of rooms. Automatic shutdown of lighting, cooling, heating, and power outlets when a guest leaves the room, along with dynamic HVAC regulation, directly reduces operating costs. In facilities operating 24/7, such optimization becomes a key factor of financial sustainability.

Operational efficiency is equally valuable. Staff can monitor room status at any time: whether a room is occupied, whether *do not disturb* is activated, whether energy is being consumed unnecessarily, or whether a fault has occurred. Automated room preparation before guest arrival, optimization of public spaces, and centralized consumption monitoring simplify reception and technical

Photograph: ABB

operations, reducing the need for manual checks and freeing staff to focus on what truly matters to guests.

ABB KNX provides what is often sought: absolute design freedom. With Busch-Jaeger premium lines—from glass and metal frames to intelligent card switches, iceLight modules, thermostats, and advanced KNX panels—technology fully integrates into the interior design vision, enhancing rather than occupying the space. Elegant surfaces, minimalist forms, and the possibility of switch branding ensure that every detail visually "belongs" to the hotel.

One of the most important advantages of KNX is its openness. This means a hotel is not tied to a single manufacturer or generation of devices. ABB equipment can be combined with hundreds of other KNX devices available on the market, reducing investment risk and ensuring long-term scalability. The system can be expanded without changing the infrastructure—new rooms, spa centers, restaurants, or conference halls can be easily integrated into the existing network.

In modern hotels, KNX installations rarely operate in complete isolation—they are typically integrated into a broader **Building Management System (BMS)** that consolidates various building subsystems: HVAC, fire protection systems, security cameras, hotel reservation software (PMS), and more. Integration of ABB KNX systems with BMS platforms can be achieved in multiple ways, depending on the platform used, but in practice, standards such as **BACnet/IP** and **Modbus** are often applied for communication between the KNX network and the supervisory system. Integration with PMS, GRMS, and BMS platforms enables unified management of all key aspects of hotel operations.

Easier Maintenance and Expansion

Although KNX systems require professional configuration during initial commissioning, once operational, they are relatively easy to maintain. ABB offers diagnostic tools, such as **i-bus® Tool**, that allow integrators to connect remotely, check device status, test communication, and more. If a hotel adds new rooms or undergoes renovation, the integrator can incorporate new devices into the ETS project and adopt the existing configuration without altering what is already functioning.

This protects the investment in the long term—KNX installations from 2025 can be upgraded in 2030 with new components that remain compatible (both backward and forward), thanks to the standard. **ETS (Engineering Tool Software)** is the official software used for designing and commissioning KNX installations.

In practice, one of the most valuable attributes is KNX stability. It operates on a wired bus system, is independent of Wi-Fi, is designed for continuous operation, and is minimally susceptible to interference. For hotels that simply cannot afford downtime, this reliability is a value that no wireless technology can replace.

Enhanced Comfort and Personalization

Guests can easily control all aspects of their room environment via elegant and intuitive panels. For example, glass **ABB tacteo® KNX sensors** provide a premium experience—at the touch of a single button, guests can dim the lights, lower the blinds, and adjust the temperature for a sleep scene.

That ABB solutions truly push the boundaries of what is possible is illustrated by another symbol of modern engineering. Recently, the sky above Dubai lit up with a spectacular façade light show on the Burj Khalifa, the world's tallest building, marking its 15th anniversary. The reason is simple yet impressive: for 15 years, ABB has ensured a reliable power supply for all key systems of this giant—from lighting, ventilation, and air conditioning to elevators and the famous fountains that reach up to 150 meters into the air.

This example perfectly illustrates what ABB does worldwide: enabling critical systems to operate flawlessly, making facilities more efficient, productive, and sustainable, and ensuring that even the most demanding projects exceed expectations. This is the essence of ABB's philosophy—**Engineered to Outrun**.

When this global expertise is combined with the flexibility and stability of the KNX standard, it becomes clear why ABB KNX solutions are present in prestigious hotels worldwide: JW Marriott Dubai, Sheraton Grand Dubai, Marriott Singapore, Courtyard by Marriott Warsaw Airport, as well as luxury resorts of brands such as Bvlgari and Yas Viceroy.

The same applies to our region. In Serbia, projects such as Hotel Mona and the hotel in Rajićeva have already been realized, while one of the most significant KNX projects currently underway is **King's Circle Residence** at Slavija—a premium hotel-residential complex being developed in phases. This project positions Belgrade among cities adopting the most advanced hospitality standards.

In the context of European decarbonization and energy transition goals, smart buildings and automation are becoming key elements of sustainable development. ABB KNX represents an example of how digital infrastructure can simultaneously enhance user comfort, reduce energy consumption, and ensure long-term investment sustainability.

In the rapidly evolving world of hospitality, ABB KNX has therefore become much more than a technological standard—it has become a strategic advantage.

13 Bulevar Peka Dapčevića st.
vanja.dugosija@rs.abb.com
www.abb.rs

HOW CAN SERBIAN HEAVY INDUSTRY REMAIN COMPETITIVE BY 2030?

As the EU accelerates the green transition, Serbia's energy-intensive industry is facing increasing environmental requirements, rising costs, and regulatory uncertainty. The Association of Serbian Energy-Intensive Industry (ASEII) today brings together key companies from the steel, cement, and fertilizer sectors to ensure their voice is clearly represented in the development of energy and climate policies. We spoke with Stanislava Simić, Director of ASEII, about the challenges, opportunities, and priorities ahead.

Q: To begin with, could you introduce the Association of Serbian Energy-Intensive Industry—what sectors does it represent, what are your key objectives, and what role do you play in supporting this part of the economy?

A: The Association of Serbian

Renewable energy sources represent one of the most direct ways to reduce emissions in energy--intensive industries and are an important element in maintaining competitiveness

Photograph: Unsplash/Christopher Burns

Energy-Intensive Industry was established as a joint platform of five leading industrial companies from the steel, cement, and fertilizer sectors, with the aim of uniting the voice of industries that form the backbone of Serbia's real economy. The founding members of the Association are Metalfer Steel Mill, Elixir Group, Holcim Serbia, Moravacem, and Titan Cementara Kosjerić.

The Association was formed to ensure the active participation of energy-intensive industry in shaping national and European energy and climate policies, particularly in the context of decarbonization and the transition toward climate neutrality. ASEII's mission is to advocate for a fair, predictable, and competitive regulatory framework that enables long-term investment, technological innovation, and industrial resilience, while simultaneously meeting climate objectives.

Q: When it comes to current challenges, how would you describe the position of the energy-intensive industry in Serbia in the context of stricter environmental criteria and increasingly demanding EU regulations?

A: The pace set by the European Union is certainly ambitious and particularly challenging for Serbia, given that we are starting the energy and environmental transition from different baseline conditions. While companies within the EU have access to dedicated funds, subsidies, and well-developed infrastructure to support the energy and environmental transition, the domestic industry is gradually aligning with similar standards, but with a more limited range of available support instruments.

Stanislava Simić
Director of ASEII

Preserving the competitiveness of the domestic industry under the conditions introduced by CBAM requires accelerated, yet sustainable decarbonization, supported by appropriate financial and regulatory mechanisms

Energy pricing remains one of the key factors of competitiveness, especially in terms of cost predictability and long-term planning. An additional challenge lies in waste management, where infrastructure capacities and administrative procedures are still under development, affecting operational flexibility.

For this reason, it is important that Serbia's energy and industrial policies evolve in parallel with the regulatory alignment process, and that industry receives ongoing support through investment mechanisms, infrastructure projects, and realistic transition timelines. Within such a framework, it is possible to preserve the industrial base while

Photographs: (bottom) Unsplash/Daniel Wiadro; (top right) courtesy of Stanislava Simić

strengthening competitiveness and meeting increasingly stringent environmental requirements through a partnership approach involving the state, industry, and international stakeholders.

Industry is already demonstrating readiness to invest in new technologies, improve energy efficiency, and reduce emissions. Our objective is to use this process to establish high standards and clear expectations for the sector's future development

Q: CBAM is already affecting domestic companies—how is this impact currently manifesting, and what are the main obstacles your members are facing?

A: CBAM is already having a tangible impact on domestic companies, even though it remains in an early phase of implementation. The impact is primarily reflected in increased business uncertainty, as the legal framework has been adopted, but the implementing by-laws defining specific rules and procedures are still pending. At this stage, companies do not have full clarity on the obligations they will face, which complicates production, procurement, and export planning, and, in certain cases, material and raw material flows have slowed.

In a broader context, major economies such as the United States, the EU, and other global actors are implementing strong industrial protection measures alongside their climate policies. In this regard, the domestic industry expects that Serbia, in line with its capacities and stage of European integration, will also provide support to companies facing new regulatory requirements.

Q: How can the domestic industry remain competitive and respond to the obligations introduced by CBAM, particularly in comparison with companies from the EU?

A: Preserving the competitiveness of the domestic industry under the conditions introduced by CBAM requires accelerated, yet sustainable decarbonization, supported by appropriate financial and regulatory mechanisms. A particularly important role in this process is played by the increased use of secondary raw materials and alternative fuels, which are already an integral part of production processes within our member companies, but whose full potential has not yet been realized. Greater utilization of secondary raw materials, alternative fuels, and more efficient waste flows—alongside further alignment of waste treatment and transit regulations with EU rules—would enable industry to simultaneously reduce emissions and optimize production costs.

Electricity generated from renewable sources represents another key pillar of the transition. A stable regulatory framework increased installed capacity, and the possibility of concluding long-term Power Purchase Agreements (PPAs) would provide companies with the certainty needed for investment planning and carbon footprint reduction.

With a predictable regulatory environment, accessible investment mechanisms, and ongoing dialogue among all stakeholders, the industry

Photograph: Unsplash/Peter Werkman

related to regulatory requirements and climate targets will undoubtedly persist, we believe they can serve as drivers of modernization rather than factors of stagnation or production decline.

Industry is already demonstrating readiness to invest in new technologies, improve energy efficiency, and reduce emissions. Our objective is to use this process to establish high standards and clear expectations for the sector's future development. The role of the Association is to bring together relevant stakeholders—industry, institutions, regulatory bodies, and other interested parties—and to contribute to a better understanding of the challenges and possible

would be able to adapt to CBAM requirements, maintain competitiveness, and become an active participant in the European green transition.

Q: What are your projections for the energy-intensive industry in Serbia by 2030—do you expect accelerated transformation, stagnation, or additional pressures that could jeopardize production?

A: By 2030, we expect a period of intensive but controlled transformation of Serbia's energy-intensive industry. Although pressures

solutions. A particular focus will be placed on education, knowledge exchange, and the establishment of constructive dialogue, so that all institutions act in the same direction and toward shared objectives.

Q: To what extent can renewable energy sources contribute to the decarbonization of energy-intensive industry, and do you see realistic potential for increasing the use of renewables in the coming years?

A: Renewable energy sources represent one of the most direct ways to reduce emissions in energy-intensive industries and are an important element in maintaining competitiveness. All member companies have expressed interest in increasing the share of renewables, as the transition to cleaner energy sources is becoming both an environmental obligation and a strategic business decision.

In the coming years, there is realistic potential for broader deployment of renewables, particularly through companies' development of their own generation capacity.

Q: To what extent are companies in this sector already applying the principles of the circular economy, and where do you see the greatest room for improvement in terms of waste reduction, energy efficiency, and resource reuse?

A: The implementation of circular economy principles in industry is underway, although companies are at different stages of development, ranging from pilot projects to more advanced solutions. The use of waste as fuel is already present; however, its full potential has not yet been fully utilized.

The greatest room for improvement lies in waste management, particularly regarding infrastructure, the availability of sufficient quantities of materials, and the proper application of the waste management hierarchy. Limiting the landfilling of materials that can be reused or energetically recovered, and retaining such waste within Serbia, are important steps. Waste should be treated as a highly valuable resource for the development of the circular economy and domestic industry and should, as such, be primarily directed toward domestic industrial use.

Additional potential also exists for generating electricity for own consumption, provided that appropriate regulatory solutions and access to funding mechanisms are in place.

Interview by Milena Maglovski

Photograph: Pixabay/Yamu Jayanath

TITAN GROUP – A LEADER IN THE SUSTAINABLE USE OF ALTERNATIVE FUELS

At a time when European industry is rapidly transforming under the pressure of decarbonization and the transition to clean energy sources, energy-intensive sectors increasingly recognize that the use of alternative fuels is not only desirable but essential. The cement industry, one of the most energy-intensive industrial sectors, stands at the heart of the sustainable transition, as every ton of clinker produced entails significant energy consumption. The use of waste-derived fuels enables the industry to reduce its reliance on fossil resources, enhance energy security, and drastically cut greenhouse gas emissions. This practice has become standard within the European Union – the average share of alternative fuels in the cement industry reaches 46.5 percent, confirming that this approach has long been part of best

Titan Group is an international company with more than a century of experience in the production of cement and construction materials

Fotografije: Titan Group

available techniques and a key driver of sector decarbonization.

It is precisely in this area that Titan Group demonstrates the full strength of its industrial leadership and strategic vision.

120 Years of Responsible Business

Titan Group is an international company with more than a century of experience in the production of cement and construction materials. Today, it operates in 25 countries worldwide, manages cement plants in 10 countries, and employs more than 6,000 people. With an annual production capacity of approximately 27 million tons of cement and related materials, the company meets the needs of local markets and global partners while remaining committed to the highest standards of quality and sustainability.

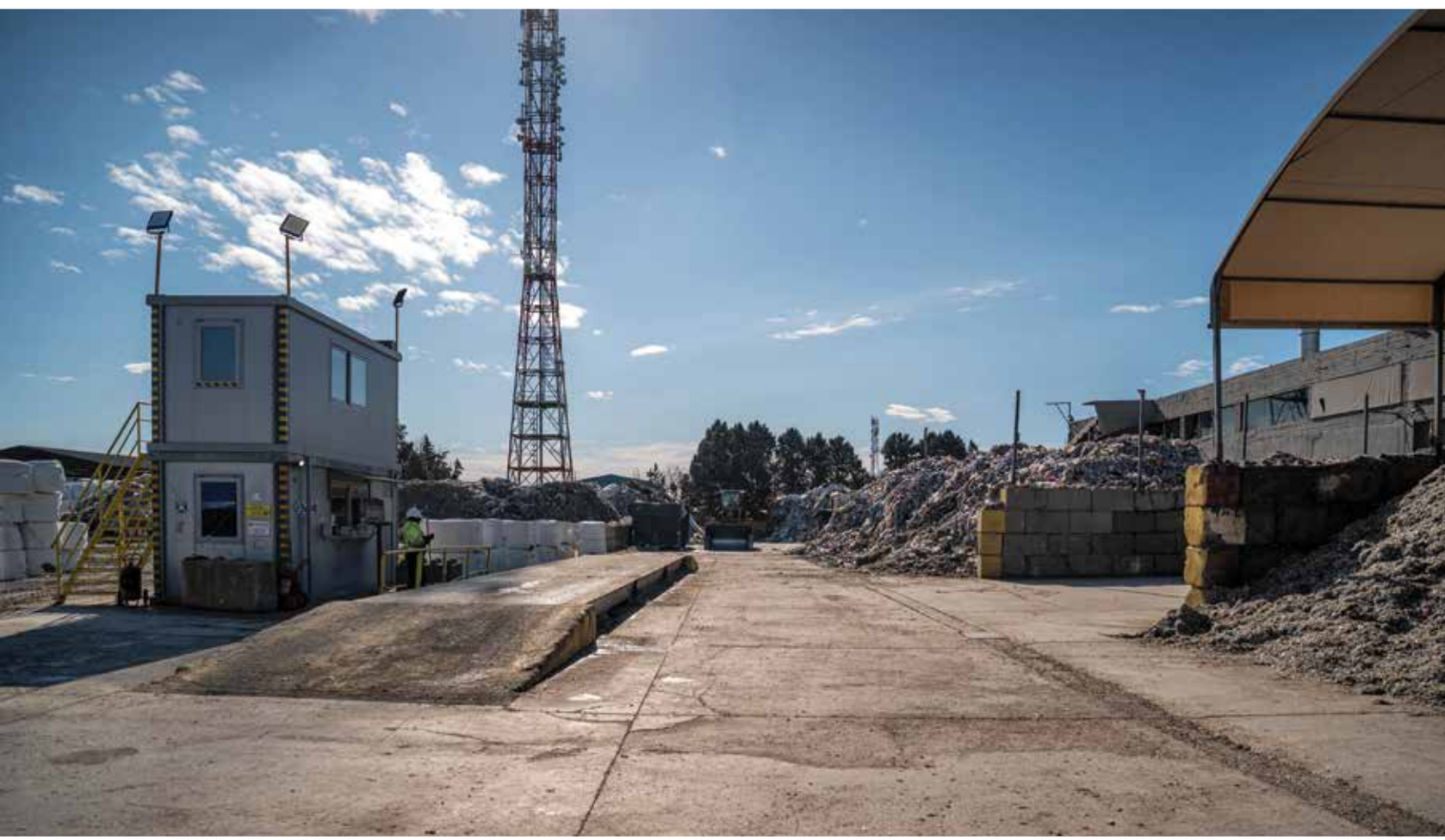
Its activities encompass the entire value chain – from the production of clinker, cement, and concrete, to aggregates and mortars, as well as the transport and distribution of construction products. By utilizing natural raw materials and introducing innovations into its production processes, the Group provides reliable construction materials that contribute to safe housing, high-quality infrastructure, and long-term societal value.

The company is an active participant in global sustainability initiatives and is committed to the United Nations 2030 Agenda. Its membership in the UN Global Compact initiative, the Global Cement and Concrete Association (GCCA), and CSR Europe confirms its dedication to responsible business practices, transparency, and the continuous improvement of environmental protection standards.

Climate Responsibility Strategy and the Role of Alternative Fuels

The cement production sector, together with the energy and transport sectors, has a significant impact on greenhouse gas emissions. Titan Group began addressing these challenges as early as the early 2000s, initially through active participation in the Cement Sustainability Initiative (CSI), and subsequently by adopting its own Climate Change Strategy in 2006. This strategy focuses on increasing energy efficiency, developing cement with lower clinker content, and, in particular, on the use of waste-derived alternative fuels through co-processing.

Alternative fuels, such as SRF (Solid Recovered Fuel) and RDF (Refuse-Derived Fuel), are produced by treating the non-recyclable fraction of municipal, commercial, and



industrial waste that would otherwise end up in landfills. Their composition includes paper, plastics, textiles, and small quantities of wood—materials that possess significant calorific value but are not suitable for further recycling. By introducing these fuels into the clinker production process, Titan Group simultaneously replaces fossil fuels and enables the most efficient use of valuable energy and material resources from waste.

Co-Processing within Titan Group

Co-processing represents a technologically and environmentally optimized process in which both the energy and material components of alternative fuels are fully utilized during clinker production. It is a globally recognized and widely applied practice that operates in accordance with the highest environmental protection standards while maintaining product quality.

The results achieved by Titan Group over the past five years confirm the effectiveness of this approach. Through the substitution of non-renewable resources with alternative fuels:

- Carbon dioxide emissions have been reduced by more than 190,000 tons;
- The carbon footprint has been reduced by an additional 250,000 tons (CO_2 equivalent);
- The amount of waste that would otherwise be disposed of in landfills has been reduced;
- Process energy efficiency has been improved;
- The circular economy has been strengthened within local communities.

All of this makes co-processing one of the most significant contributions to industrial decarbonization in the region, and a clear example of how industry can transform without compromising quality, safety, or competitiveness.

What the Co-Processing Looks Like

It is important to emphasize that the use of alternative fuels cannot be viewed solely through the lens of fuel substitution. It represents a profound transformation in the way industry perceives resources, energy, and waste. The model in which materials that have lost their original function are reintegrated into the industrial cycle, thereby creating new value, lies at the core of modern circular strategies. Titan Group does not regard this process merely as a technical innovation. Still, it is a broadly defined business philosophy, one in which every resource is used rationally, and every improvement step is assessed through its impact on the community and the environment.

This approach is particularly relevant in the context of the global search for solutions that simultaneously reduce emissions, ensure a stable energy supply, and contribute to addressing waste management

challenges. In many countries, including the markets where Titan operates, landfills represent a serious environmental issue and a long-term burden for local communities. The use of non-recyclable materials as alternative fuels offers an opportunity to significantly reduce this burden, preventing methane emissions and freeing up space that would otherwise be occupied by waste.

Another important aspect is that co-processing technology takes place under strictly controlled conditions, at high temperatures in the kiln, and with rigorous monitoring of combustion parameters. This ensures that the process is carried out safely, without additional environmental burden, and with full utilization of the energy potential of alternative fuels. At the same time, minimal additional waste is generated, as mineral residues are incorporated into the final product—clinker.

Such an approach clearly demonstrates that sustainability is not a separate segment of operations, but an integral part of Titan Group's strategy. In doing so, the company confirms that the modern cement industry can be a driver of positive change, that decarbonization can be economically viable, and that cooperation between industry, communities, and regulatory frameworks yields results that extend beyond the boundaries of a single plant or country. Titan Group continues to invest in innovations and practices that set new standards, paving the way toward a more energy-efficient, cleaner, and sustainably resilient industry.

Emissions and combustion parameters are measured and controlled in accordance with international and national standards

The Co-Processing Process – Key Steps

The co-processing process itself consists of several key stages:

1. **Collection and Selection of Materials** – Solid recovered fuel (SRF/RDF) is produced from non-hazardous municipal and industrial waste. The fuel is prepared in appropriate facilities within recycling centers in accordance with strict standards, including control of its chemical and calorific composition. Cement plants receive prepared fuel that meets prescribed quality requirements.
2. **Preparation and Testing** – Upon receipt at the cement plant, the alternative fuel undergoes quality control before being unloaded into the dosing system. If it does not meet the prescribed quality standards, it is rejected and returned to the supplier. This step ensures that the alternative fuel is suitable for dosing into the rotary kiln and that the combustion process remains safe for the environment and the local community.
3. **Dosing and Combustion in Rotary Kilns** – Alternative fuels are co-fired with fossil fuels in controlled quantities to optimize clinker production. This approach reduces fossil fuel consumption and increases overall process energy efficiency.
4. **Monitoring and Control** – Each stage of the process is continuously monitored. Emissions and combustion parameters are measured and controlled in accordance with international and national standards.

An Industry Building a Sustainable Future

The use of alternative fuels and the continuous improvement of processes confirm that Titan Group not only follows global trends but also sets standards in sustainable cement industry practices. Through responsible resource management, the implementation of innovation, and long-term commitment to climate goals, the company contributes to reducing environmental impact and strengthening the circular economy.

The industrial future is being built today, and Titan Group demonstrates how a strong vision, investments in technology, and dedication to the community can transform one of the most demanding industrial sectors—turning it into a driver of sustainable change.

Prepared by Milena Maglovski

NEW SOLAR POWER FACILITY AT THE PANČEVO OIL REFINERY

With the construction of this new solar power plant in Pančevo, NIS further strengthens the use of renewable energy sources within its facilities, while MT-KOMEX confirms its position as a company that continuously raises standards in the solar energy sector and delivers new benchmark projects in industrial environments

A new 550 kW solar power plant has been installed on the rooftops of six buildings at the Pančevo Oil Refinery, representing another in a series of projects delivered by MT-KOMEX for NIS a.d. Novi Sad. MT-KOMEX is a leading domestic contractor in the field of solar energy and a pioneer of industrial energy transition in Serbia.

The solar power plant is distributed across approximately 2,720 m² and is installed on six non-production facilities. A total of 1,053 Luxor Solar photovoltaic panels, each with a nominal output of 580 Wp, generate electricity primarily for the refinery's own consumption, while surplus energy is fed into NIS's closed distribution system under the prosumer (buyer–producer) model.

Special attention was given to ensuring system reliability under demanding industrial conditions. The installation of 13 Huawei inverters with a total nominal capacity of 300 kW, along with 527 optimizers, ensures high efficiency of each solar string, even in conditions of partial shading. The system includes DC and AC distribution cabinets, cable junction boxes, and a SMART Logger system, enabling advanced real-time management and monitoring.

As the project contractor, MT-KOMEX once again applied its proven technical solutions—from precise planning of panel layouts on both flat and pitched rooftops to the integration of the solar power plant with the medium-voltage network of the closed distribution system at the 6 kV level, which supplies the entire refinery.

With the construction of this new solar power plant in Pančevo, NIS further strengthens the use of renewable energy sources within its facilities, while MT-KOMEX confirms its position as a company that continuously raises standards in the solar energy sector and delivers new benchmark projects in industrial environments. Once again, it is demonstrated that the transition to cleaner and more secure energy is built—panel by panel.

Prepared by Milena Maglovski

Photograph: (on the previous page) Ivan Kićanović

THE DIGITAL AND AI REVOLUTION IN ENERGY SYSTEMS

The world is in the midst of an intensive energy transition, in which renewable energy sources, smart grids, and technological innovations are transforming the generation, distribution, and consumption of electricity. In this process, digitalization and artificial intelligence (AI) are becoming key tools for optimizing grid operations, enabling more accurate consumption monitoring and renewable generation forecasting, and for developing new business models that directly connect producers and consumers.

In its latest report, Innovation Landscape for Sustainable Development Powered by Renewables (IRENA, 2026), the International Renewable Energy

Digitalization enables monitoring, forecasting, optimization, and automation of operations across entire power systems

Photograph: Unsplash/Taylor Vick

Agency (IRENA) presents the Innovation Toolbox—a package of 40 innovative solutions designed to support policymakers in the strategic development of more resilient power systems, the expansion of access to energy, and the promotion of local development. The solutions are grouped into four categories:

(1) technology and infrastructure,
(2) business models and key stakeholders,
(3) regulation and market design, and
(4) system planning and operations.

These innovations should not be viewed in isolation, as only when implemented as an integrated system can they deliver meaningful results.

This article presents solutions related to digitalization and the application of artificial intelligence that fall within the first category—technology and infrastructure. IRENA

defines digitalization as the integration of digital technologies into the planning, operation, and management of power systems. This includes the use of sensors, smart meters, communication networks, data-processing platforms, and automation tools, all intended to enhance grid reliability, efficiency, flexibility, and active user engagement. Digitalization enables monitoring, forecasting, optimization, and automation of operations across entire power systems.

This is not merely a matter of replacing analogue solutions with digital ones, but rather a long-term, transformative process that leverages advanced computing capabilities to develop smart, automated systems. Its relevance becomes particularly pronounced in the context of increasing

Photograph: Unsplash/Immo Wegmann

decentralization of generation and the growing share of variable renewable energy sources. In many parts of the world, a key challenge remains the lack of advanced monitoring and data management systems, which directly affects grid reliability and often leads to disruptions in electricity supply. In this context, solutions that enhance grid visibility and autonomy in grid management are particularly important.

The IRENA report highlights two groups of innovations with the potential to enhance the performance of existing grids significantly: **monitoring systems**, which enable reliable and timely decision-making, and **smart** and **autonomous systems**, which deliver advanced automation and optimization of power system infrastructure operations.

Monitoring Systems

Monitoring forms the foundation of power system digitalization, enabling data collection, transmission, and processing across the entire energy supply chain. The key digital technologies it encompasses include sensors, smart meters, SCADA systems, and advanced monitoring systems.

Sensors are the primary tools for data acquisition and for measuring various parameters, such as voltage, current, temperature, humidity, and other physical quantities. Advanced sensors may offer additional functionalities, including AI-enabled capabilities and nanoscale measurements—highly precise measurements that detect subtle changes within the grid.

Smart meters are installed at end-user premises and provide detailed insights into electricity consumption and enable two-way communication with distribution system operators. These meters are part of the **Advanced Metering Infrastructure (AMI)**—a system that connects all smart meters to the distribution network and the operator's central software platform.

SCADA systems (Supervisory Control and Data Acquisition) represent the next level of grid digitalization. They combine hardware and software to enable operators to monitor and control processes in real time, including remote device operation. SCADA systems measure voltage, current, temperature, and other parameters; control circuit breakers and other equipment; monitor machine speed and frequency, power output, the status of boilers and turbines, and the condition of safety equipment. In addition, they support load planning and demand allocation.

In transmission networks, SCADA systems monitor circuit parameters, relay operation, voltage levels, and transformer tap changes, facilitating grid restoration after outages and network reconfiguration during maintenance. In distribution networks, SCADA reduces outages and the need for manual intervention by rapidly locating faults and enabling swift response. SCADA systems also serve as the foundation for the development of more advanced data analytics and grid management systems.

Advanced monitoring systems go a step further by integrating multiple

Photograph: nsplash/Igor Omilaev;

data sources—from smart meters and Phasor Measurement Units (PMUs) that precisely measure voltage and current at various locations, to real-time weather data. Based on these inputs, **Wide Area Monitoring Systems (WAMS)** can be developed to enhance the intelligence and resilience of existing power grids.

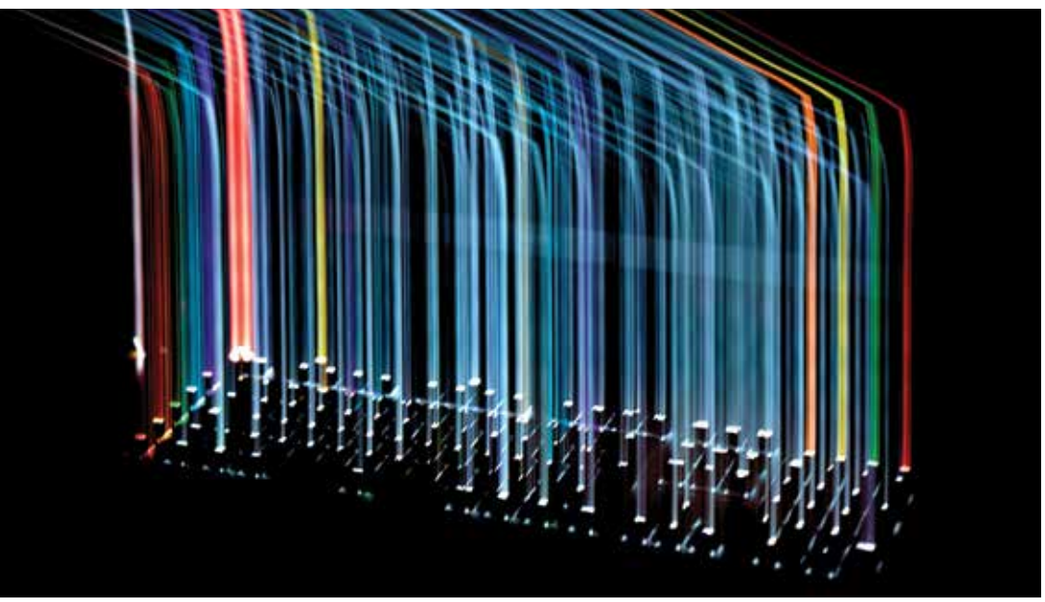
Smart and Autonomous Systems

Smart and autonomous systems represent the next level of digital transformation in the power sector, building upon existing monitoring systems. Unlike monitoring, which provides visibility into grid conditions, smart and autonomous systems use collected data to enable automated decision-making, operational optimization, and independent real-time responses to change.

In its report, IRENA highlights three digital technologies that, when combined, constitute a powerful tool for managing complex power systems:

- the Internet of Things (IoT),
- artificial intelligence (AI), and
- blockchain technology.

IoT connects smart devices across the network, thereby increasing system flexibility and enabling operators to better monitor system conditions. By linking energy production, consumers, and grid infrastructure, IoT facilitates the management of complex systems. It also creates new business opportunities, as users can generate revenue or reduce costs by providing additional services and adjusting their consumption to meet grid needs.



Smart meters are installed at end-user premises and provide detailed insights into electricity consumption and enable two-way communication with distribution system operators

AI analyzes large volumes of data and makes decisions without manual programming. In power systems, AI contributes to forecasting generation from variable renewable energy sources, predicting electricity demand, optimizing grid operations, supporting predictive maintenance of equipment, and enhancing system stability. AI plays a particularly important role in decentralized generation environments, where fast and accurate balancing of supply and demand is essential. However, the development of AI solutions requires robust infrastructure, high-quality data, and skilled personnel, which can pose challenges. In addition, most available datasets originate from developed countries, meaning that AI solutions are not always sufficiently adapted to the conditions of developing economies.

Blockchain introduces a new dimension to power system management by enabling decentralized, secure, and transparent data and value exchange without reliance on a central intermediary. Its application is particularly relevant in direct (peer-to-peer) electricity trading models between producers and consumers, as well as through smart contracts that automatically execute transactions once predefined conditions are met. In this way, transaction costs are reduced, system efficiency is improved, and trust among market participants is strengthened.

As noted at the beginning of this article, none of these tools can achieve a significant impact on their own. However, when combined and layered together, their contribution becomes substantial. In this context, sensors, smart meters, and SCADA systems can be viewed as the senses of the power system, collecting data and enabling real-time monitoring and control. These data are then interconnected via IoT, which delivers them where needed and creates a network capable of intelligent energy management. The next layer is AI, which analyzes data, identifies patterns, and makes decisions, while blockchain ensures that every transaction and change is secure, transparent, and reliable.

Prepared by Katarina Vuinac

Photograph: Unsplash/Adrien


P
Samo za EV
u toku punjenja
charge&GO
EVlink

GUARANTEES OF ORIGIN AS A TEST OF TRANSPARENCY IN E-MOBILITY

E-mobility is often presented as an automatic synonym for decarbonization, yet one crucial aspect is frequently overlooked—where does the electricity used to charge these vehicles actually come from? In many countries where the power mix still relies heavily on coal, electric vehicles may reduce local air pollution, but their overall climate impact remains limited. Without clear data on emissions per kilowatt-hour, charging periods, and grid impact, the message of clean driving lacks transparency.

For this reason, truly clean e-mobility is only that which is directly linked to renewable energy sources. A vehicle predominantly charged with green electricity—without placing additional strain on the system—forms part of a broader e-mobility strategy, as it simultaneously decarbonizes electricity generation and modernizes the grid. This is the direction toward which much of the world is already moving.

To further confirm its commitment to the green agenda, Charge&GO has procured Guarantees of Origin

(GoO) on the open market, issued by Green Balancing Group, whose portfolio consists exclusively of energy generated from renewable sources.

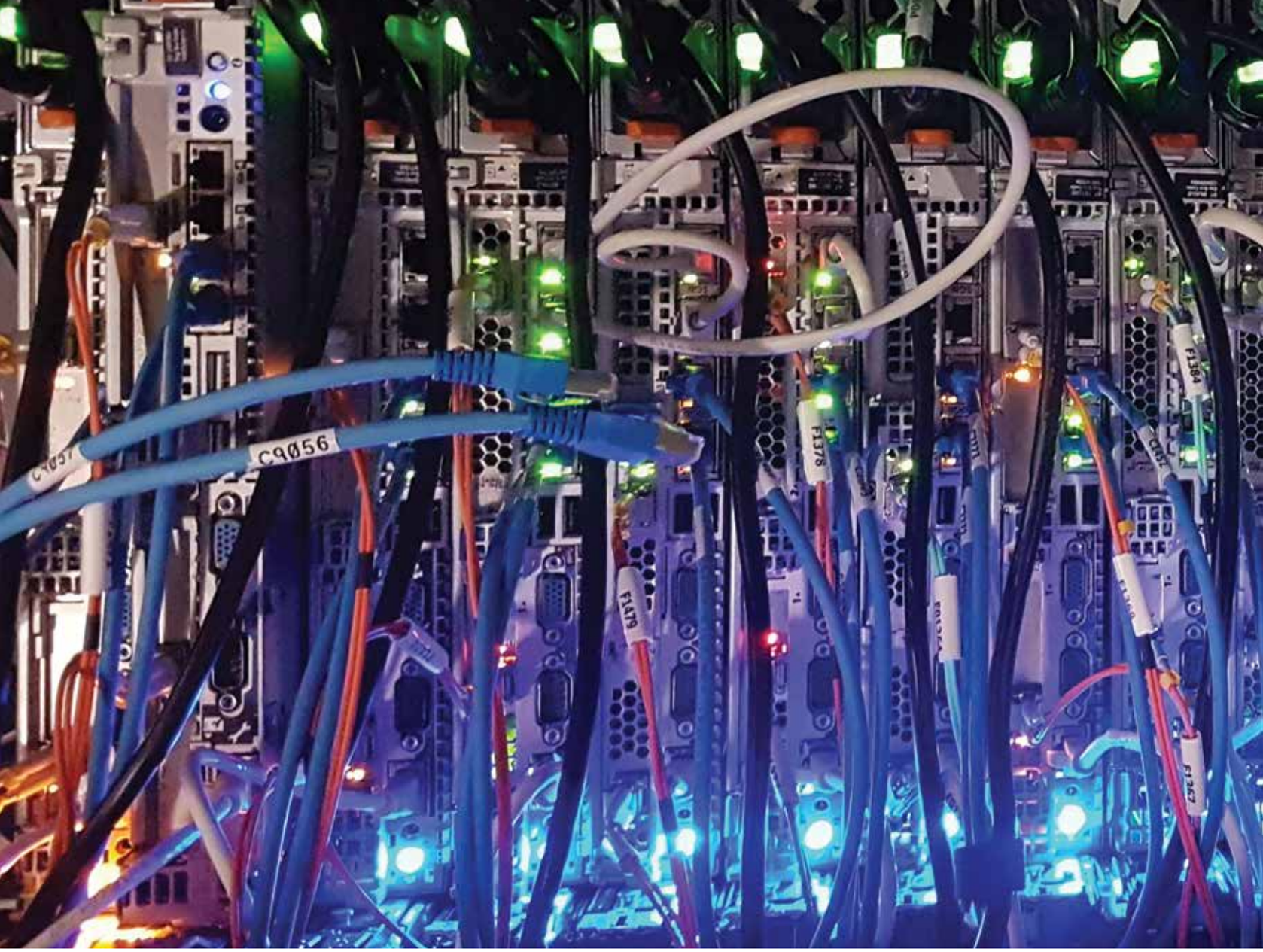
In this way, the company provides its users with clear confirmation that charging sessions—equivalent to approximately six million kilometers driven—are covered by electricity from renewable sources. For 2026, guarantees have already been secured in advance from the well-known DeLasol solar power plant in Lapovo.

Guarantees of Origin are electronic certificates confirming that electricity has been generated from solar, wind, hydro, or biomass sources. The registry and verification process are managed by Elektromreža Srbije (EMS). This mechanism enables suppliers to certify the origin of electricity to customers while simultaneously encouraging further development of renewable energy.

When the numbers are presented, it becomes clear how significant the demand for Charge&GO's services is, given the volume of charging across its network and the transparency the company provides. Without measurable indicators, green e-mobility remains more of a slogan than a tangible result.

Prepared by Milica Vučković

Photographs: Charge&GO

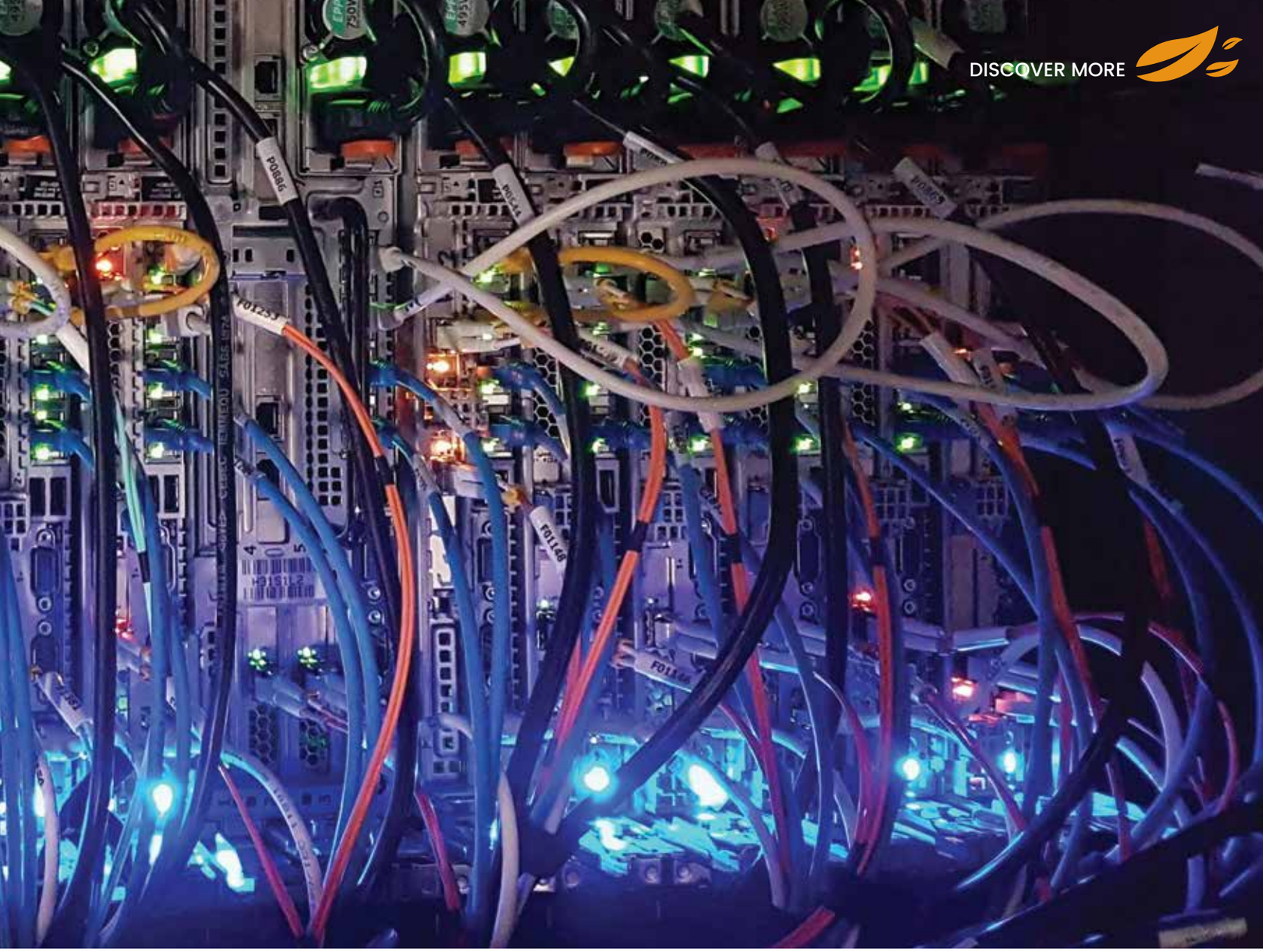


INVISIBLE INFRASTRUCTURE THAT CONSUMES REAL RESOURCES

The digital world is full of concepts that seem abstract but are, in reality, highly tangible. The internet, although we often perceive it as something that is "all around us," is not an invisible system but a network of networks built on physical infrastructure. Users access it through local internet service providers, which are further connected to regional providers, and then to global Tier 1 providers. At its very foundation lie data centers and submarine cables — tangible infrastructure through which data travels and without which modern digital communication would not be possible.

All the photos and files we store virtually — for example, via iCloud — do not disappear into some abstract digital fog but are physically stored on data

When we send a message to artificial intelligence, it first travels over the internet to the servers where a particular AI model is instantiated



storage devices in real, often distant facilities. These are large systems of disks, networked servers, and equipment for copying and protecting against data loss, arranged so that the same content is often stored in multiple locations to ensure that nothing is lost or disappears. Everything happens through browsers and applications, but behind every click stands infrastructure operating 24 hours a day — computers that receive, write, store, and return data, with constant power supply and cooling. That is precisely why the data center is one of the key components of today's digital infrastructure.

All of this must be powered by electricity. However, storing data is not the whole story. In just a few years, artificial intelligence (AI) has moved from research laboratories to tools people use every day, which is why it is now discussed by world leaders and companies striving to implement it as quickly as possible. Yet behind that seemingly simple experience — typing a message and receiving a response — lies an infrastructure that is highly demanding in terms of resources. Its rapid progress has unfolded in parallel with the narrative of decarbonization and the energy transition, which is why data centers, especially those focused on AI, are increasingly entering the political arena and influencing decision-making processes, including energy policies.

Challenges of Electricity Consumption and Heat Generation

When we send a message to artificial intelligence, it first travels over the internet to the servers where a particular AI model is instantiated. These servers are almost always located in large data centers operated by cloud providers (such as Google, Microsoft, or Amazon infrastructure) or in the data centers of the company offering the service. These are the places where requests are actually processed, which makes it clear that the model does not think on our device — its brain is located in a data center.

If one of us asks ChatGPT 30 questions during the day, electricity consumption can only be roughly

Photograph: Unsplash/Massimo Botturi

estimated, as it depends on the length of the conversation, the model type, system load, and the data center's operational mode. Nevertheless, as a reference point, a recent estimate by Samuel Altman (CEO of OpenAI) is often cited. In a blog post published on June 10, 2025, he stated that an average query consumes approximately 0.34 Wh of energy.

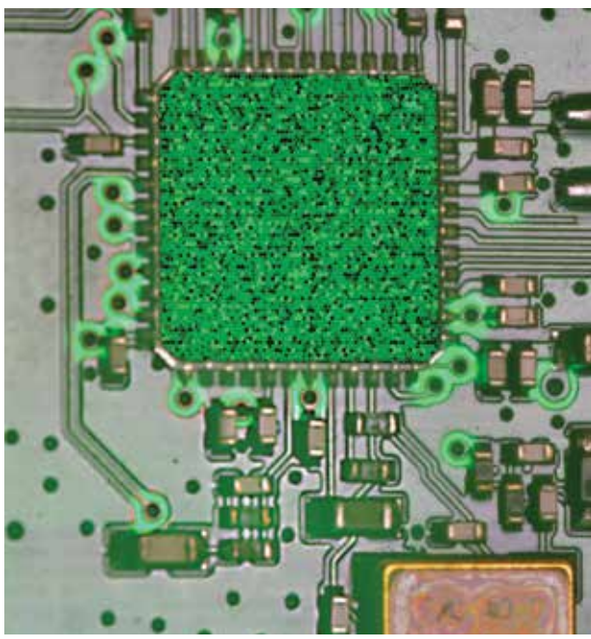
If this value is taken as purely indicative, 30 queries in a single conversation would amount to approximately 10.2 Wh, or 0.0102 kWh — which, very roughly speaking, corresponds to the amount of electricity consumed by a 10 W LED bulb in about one hour. A single such query is far more energy-intensive than one Google search.

Given that running AI models requires electricity, data centers — for example, those operated by Google — continuously strive to optimize energy use in order to deliver more computing power. From 2010 to 2024, the company signed more than 170 power purchase agreements (PPAs) totaling over 22 GW of clean energy capacity, which is comparable to Portugal's total renewable energy capacity in 2024, according to company data.

According to some estimates, there are more than 10,000 data centers worldwide. Of these, the United States holds a dominant first place, while Europe appears to lag behind. To improve its position, Europe must become a suitable host for the required infrastructure, which directly raises the issue of energy supply. Nevertheless, the Nordic countries stand out on our continent as particularly attractive destinations for data center construction, as they address the challenge of securing the necessary resources.

Norway, in its strategy and related communications, explains why this region has increasingly been seen as a natural environment for data centers in recent years. The reasons lie in the abundance of renewable electricity and the colder climate, which reduces the energy required for server cooling, resulting in lower operational costs than in warmer parts of the world. According to national estimates, electricity consumption in this industry is expected to grow from 2.5 TWh in 2024 to 6.0 TWh by 2030 (with scenarios reaching up to 8 TWh by 2040), with big data and artificial intelligence cited as key drivers.

Increasing water demands in certain areas can put local water resources at risk



For this reason, Norway's strategy strongly emphasizes the issue of surplus heat produced as waste, which can be used to heat buildings or be integrated into district heating systems — but only where infrastructure and investment agreements are in place (pipelines, heat pumps, management systems). The government has introduced a requirement that new data centers above 2 MW must conduct a cost-benefit analysis of using surplus heat, a regulation that has been in effect since April 1, 2025.

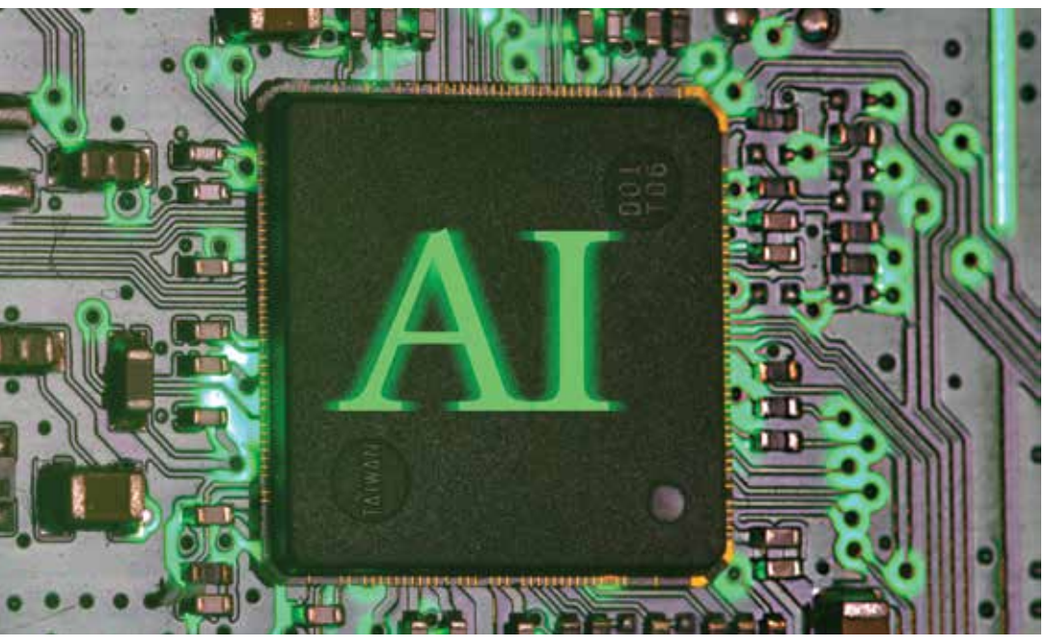
As all aspects must be taken into account, certain cold regions also face significant limitations. Although they offer excellent conditions for building data centers, the location must be sufficiently close to a major city or airport so that, in the event of unforeseen circumstances, technical teams, equipment, and emergency services can respond as quickly as possible.

Photographs: (top) Unsplash/Emiliano Vittoriosi; (middle) Unsplash/Immo Wegmann

Water Consumption as a Consequence of Cooling Requirements

Heat generation is an inevitable process in data centers, which brings us to the issue of water consumption.

When our home computer system slows down because we have too many tabs and programs open at the same time, it means that the processor is working more intensively, consuming more electricity, and converting part of that energy into heat. As a result, fans must continuously expel hot air to prevent the chips from overheating. In data centers, this same principle is upscaled to industrial levels. Necessary cooling is achieved in various ways; however, water transfers heat far more



efficiently than air (for example, through air conditioning systems). For this reason, in some cases, facilities are built near large water sources or rivers, as this makes it easier to ensure stable heat dissipation. The greater the computational workload (especially for artificial intelligence), the more heat is generated, and consequently, the greater the need for electricity and cooling.

According to a report published by the Environmental and Energy Study Institute (EESI), a medium-sized data center can consume up to approximately 110 million gallons of water annually for cooling (1 gallon ≈ 3.7 liters), which is comparable to the annual water consumption of roughly 1,000 households. Large data centers can reach up to five million gallons per day — a level comparable to the consumption of a city with 10,000 to 50,000 residents. Additionally, some of the report's estimates for the United States indicate daily water consumption exceeding four hundred million gallons, with expectations of further growth as facilities become more numerous and larger.

Increasing water demands in certain areas can put local water resources at risk, strain infrastructure, and even trigger new local political issues.

Although possible solutions and mitigation measures are mentioned, the question remains whether the future will truly make our lives easier or more complex. As the world "accelerates," the gap widens between what technology can do and what society must manage. Within this network of relationships, digitalization and artificial intelligence are no longer merely topics of innovation but matters of energy, water, grid infrastructure, space, and public interest. Technology does not live in the cloud — it has a physical cost, its cables, its servers, its consumption. It is precisely here that ecology ceases to be a secondary issue and instead becomes the measure of how sustainable development truly is — and who benefits from it, and who bears the cost.

Prepared by Milica Vučković

Photograph: Unsplash/Taylor Vick

MOLDOVA ACCELERATES ENERGY INTEGRATION WITH THE EU: FROM APRIL 1, IT OPENS THE GAS MARKET TO LARGE CONSUMERS

Moldova entered 2026 with ongoing energy sector reforms. According to information from the Energy Community Secretariat, in 2025 Moldova was, for the second year in a row, ranked as the leading reformer among the Energy Community Contracting Parties in implementing measures that support integration with the EU energy market.

In other words, the comparison does not refer to all European countries or EU member states, but to the group of countries that are part of the Energy Community framework and are aligning their energy legislation with EU rules. This group also includes Serbia, Montenegro, Bosnia and Herzegovina, and North Macedonia.

One of the key steps in this process is due on April 1, 2026, when Moldova plans to abolish regulated gas prices for large consumers (not households), including energy and district heating companies, industry, and commercial users, which, according to some data, account for around 55 percent of national gas consumption. The transition to market-based pricing will be gradual. Liberalization for medium-sized consumers is planned by April 2027, while households, small businesses, and providers of essential services will still be able to choose between regulated supply and market-based contracts.

Progress in the gas sector comes after the 2021–2022 crisis, when supply disruptions exposed the risks of relying on a single supplier. In the meantime, Moldova has worked on diversifying supply sources and routes, while additional room for competition and more secure supply is seen in strengthening regional gas flows.

At the same time as reforms in the gas sector, Moldova's electricity sector reached an important institutional milestone in 2025 by fully transposing the package of regulations for electricity market integration. This paved the way for future integration with the EU internal electricity market even before formal EU membership, pending expected verification by the European Commission.

Energy Portal

MONTENEGRO ONE STEP CLOSER TO INTEGRATION INTO THE EUROPEAN ELECTRICITY MARKET

The Secretariat of the Energy Community announced that on February 15, Montenegro finalized the transposition of the Electricity Integration Package by adopting the last two legal acts – government regulations that define the operational rules of the power system, procedures for emergency situations, and system restoration.

Combined with the Energy Law and the new Law on Cross-Border Exchange of Electricity and Natural Gas, Montenegro now has a modern, clear, and stable legal framework, the Montenegrin Ministry of Energy and Mining stated.

This regulatory leap represents a key prerequisite for joining the Single Day-Ahead Coupling (SDAC) and the Single Intraday Coupling (SIDC) of the European Union – mechanisms that enable more efficient trading, more stable supply, and better integration of renewable energy sources. Thanks to the new rules, Montenegro can access these mechanisms even before full EU membership.

Montenegro has thus become the third contracting party of the Energy Community to fully transpose the Electricity Integration Package, after Serbia and Moldova. The Secretariat of the Energy Community expressed its readiness to provide full support to Montenegro in the effective implementation of the new framework and in accelerating the development of a market based on competition and sustainability.

The Ministry of Mining and Energy of Montenegro stated that by adopting the two legal acts, Montenegro has achieved one of the key milestones in its energy transition, significantly improving the competitiveness of its electricity market and opening the door to deeper integration into European energy flows.

Energy Portal

Photographs: (left) Pixabay/Gerd Altmann; (right) Pixabay/Velimir Marinković

ĐEDOVIĆ: PREPARATION FOR THE CONSTRUCTION OF A NUCLEAR POWER PLANT WILL TAKE AROUND FOUR YEARS

Minister of Mining and Energy Dubravka Đedović Handanović chaired the first meeting of the Interministerial Expert Working Group tasked with examining the justification for embarking on the development of nuclear energy. Together with the Group for the Preparation and Implementation of the Nuclear Energy Program, this body will form the future National Nuclear Energy Program Implementing Organization (NEPIO). The establishment of NEPIO is expected in the coming weeks, according to a statement from the Ministry of Mining and Energy.

As the Minister emphasized, Phase 1 will be completed by mid-next year and will include a comprehensive analysis of the necessary legislative framework, as well as technical, safety, market, and human resource requirements. This phase will involve all relevant institutions and the wider public, alongside cooperation with the International Atomic Energy Agency. The outcome of this phase will be a comprehensive report and a proposal for Serbia's national position on the application of nuclear energy.

This will be followed by Phase 2, which involves preparation for the construction of a nuclear power plant. According to Đedović Handanović, the entire initial preparation process would take around four years.

Photograph: Pixabay/Markus Distelrath

As part of the analysis, the potential involvement of domestic industry in the nuclear program will also be considered. The first four studies will be prepared in cooperation with the French company EDF, with the support of the French Development Agency, based on an intergovernmental agreement between Serbia and France.

"We will rely on the French electricity utility, but as far as the specific technology to be used is concerned, no decision has yet been made, and this will be subject to further analysis. The location where the plant would be built will have to meet all safety criteria, but all of this will be decided in the years ahead. Our industry can contribute to the development of the nuclear program, and it is important that these potentials are identified and analyzed in a timely manner in order to strengthen the value chain in our country. The contribution to the local economy, for example, in the United Arab Emirates during the development of its nuclear program, amounted to around USD 7 billion," the Minister stated.

Đedović Handanović also recalled that 20 national institutions have already signed a Memorandum of Understanding in the field of nuclear energy, which provides a foundation for coordinated work on this long-term and complex project.

Members of the Interministerial Expert Working Group will include representatives of numerous institutions, among them the Institute of Nuclear Sciences Vinča, the Nikola Tesla Electrical Engineering Institute, the Serbian Nuclear Society, SRBATOM, Nuclear Facilities of Serbia, Elektromreža Srbije, Elektroprivreda Srbije, as well as several ministries.

The working group faces a multi-year task of establishing the foundations for introducing nuclear energy into Serbia's power system, with the aim of increasing the country's long-term energy security.

Energy Portal

300 GW OFFSHORE WIND POWER AGREED BY 2050 AT NORTH SEA SUMMIT

At the North Sea Summit held yesterday in Hamburg, leaders and energy ministers from the North Sea region reached an agreement on strong and coordinated cooperation to accelerate the development of offshore wind energy, enhance energy security, and reduce Europe's dependence on imported fossil fuels. According to a statement by the European Commission, the focus is on stable, secure, and affordable energy, as well as the development of hydrogen, aiming to strengthen the competitiveness of European industry globally.

A series of declarations were signed in Hamburg outlining specific measures and timelines to reduce investment risks for cross-border electricity network connections, as well as to enhance the resilience of the energy system against physical, cyber, and hybrid threats.

The central document of the summit is the Joint Offshore Wind Investment Pact for the North Sea, signed by representatives of the governments of Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway, and the United Kingdom, together with the wind energy industry and transmission system operators (TSOs) for electricity and hydrogen networks.

The Pact emphasizes the vision of the North Sea as "Europe's green power plant" and reaffirms the collective determination to harness its enormous offshore wind energy potential.

The Pact sets out that Europe should reach 300 GW of installed offshore wind capacity in the North Sea by 2050. EU member states participating in the North Seas Energy Cooperation (NSEC), together with the United Kingdom, aim to develop up to 100 GW of capacity through joint cross-border projects, which would deliver the greatest benefits in terms of reducing

Key Commitments Include:

- Establishing an Offshore Financing Framework (OFF), building on existing instruments such as the TEN-E framework and Projects of Common Interest;
- Implementing the first joint projects totaling 20 GW in the 2030s, in line with cooperation plans of transmission system operators and investors;
- Improving national regulatory frameworks to enhance investor confidence, including cross-border liability, grid connection, and balancing schemes;
- Developing suitable market arrangements for hybrid offshore projects;
- Fairer allocation of tenders for offshore wind between 2031–2040, with the goal of installing up to 15 GW per year at the European level.

Photo-illustration: Pixabay

Representing the European Commission at the summit, Commissioner for Energy and Housing Dan Jørgensen emphasized that Europe, in turbulent geopolitical times, must choose energy independence through investment in clean, secure, and domestic energy.

"Hardly anything is greater than the North Sea and its enormous offshore wind potential. This means strengthening our interconnections so that affordable energy can flow freely across our continent. And it means securing our industrial leadership while guaranteeing our safety," Jørgensen said.

Leaders also committed to close coordination on planning, cost-sharing, and financing of cross-border projects, as well as ensuring quality jobs, skills development, and targeted research and innovation activities.

Energy Portal

Photograph: Pixabay/Erich Westendarp

ROMANIA STRENGTHENS RENEWABLE ENERGY CAPACITY WITH 190 MEGAWATTS OF SOLAR POWER

Romania is launching the construction of three solar power plants with a total capacity of 190 megawatts (MW), enough to supply electricity to more than 160,000 households.

The European Investment Bank (EIB) is investing 34 million euros in the project, as part of a 121 million euros financing package. The project is also financed by the European Bank for Reconstruction and Development (EBRD) and the Romanian bank BCR. The three companies that will build and operate the power plants are jointly owned by the Norwegian renewable energy company Scatec ASA (65 percent) and Defic (35 percent), a platform for the development and investment in renewable energy sources.

The planned locations are in the counties of Olt and Dolj, in the Oltenia region, which borders Bulgaria and the Danube River. According to the EIB, construction will begin this month, while full commercial operation is expected in September 2027.

The new facilities are among the largest solar projects in Romania and will accelerate the country's transition away from fossil fuels, contributing to emissions reductions and increased energy independence. Two of the three planned solar plants have already secured Contracts for Difference (CfD) through a government auction held in 2024, covering around two thirds of the project's expected output for nearly 15 years. The municipalities where the three solar power plants will be located are Dobrun and Sadova.

The project also supports Romania's goal of having renewable energy sources account for more than 38 percent of final energy consumption by 2030, as well as the EU's target of reaching at least 42.5 percent over the same period.

The implementation of these power plants is expected to further strengthen regional development, create new jobs, and contribute to enhancing Romania's energy security.

Energy Portal

NEW RES AUCTIONS: UNITED KINGDOM ADDS 1.3 GW OF ONSHORE WIND CAPACITY

Following successful offshore wind auctions, the United Kingdom has awarded contracts for 1.3 GW of new onshore wind capacity in the latest auction round.

Contracts for a total of 28 onshore wind projects were awarded under the Contracts for Difference (CfD) scheme. Once completed, these projects will generate enough electricity to supply 1.2 million households, while contributing to lower electricity bills for households and businesses.

The largest share of contracts for onshore wind projects was awarded to projects in Scotland, while five contracts were granted in Wales.

Overall, the latest auctions across all technologies—offshore and onshore wind, solar, and tidal energy—will deliver a total of 14.6 GW of new renewable energy capacity. These projects are expected to support around 10,000 jobs and attract 5 billion pounds in private investment, according to WindEurope.

The United Kingdom aims to reach 27–29 GW of onshore wind capacity by 2030, which means that an additional 7.7–9.7 GW will need to be contracted in the next two auction rounds.

Energy Portal

Photographs: (left) Pixabay/Samuel Faber; (right) Pixabay/Matthias Böckel

BOBIJA PROJECT, WESTERN SERBIA: NEW SAMPLING INDICATES GREATER POLYMETALLIC POTENTIAL

Australian company Middle Island Resources (MDI), focused on gold and base metals exploration, announced in its publications in September last year that it would carry out geological exploration at the Bobija project in western Serbia, considered prospective for gold, silver, copper, lead, and zinc deposits. As previously reported, this marked the first development phase of the portfolio of Konstantin Resources, which was acquired by MDI. The site includes an abandoned mine that has long been inactive. In addition to the former mine, the area is known as the "roof of Azbukovica," specifically the crest of a hilly-mountainous zone where the Drina River separates Serbia and Republika Srpska. Bobija was originally explored during the former Yugoslavia period, when underground works and several drilling campaigns were conducted in search of barite, lead, and zinc, with indications of gold and silver also identified at that time.

The project is located near Ljubovija and comprises six mineral licenses covering a total of 208 square kilometers, as detailed in the company's earlier announcement. The first exploration phase focused on the historical Bobija mine area, where barite-sulfide mineralization can be clearly observed in the floor of the former open pit. The company then announced sampling, beginning with rock-chip sampling from outcrops and fractures.

According to the company, based on its geological analogy, Bobija shares many similarities with the well-known Vareš project in Bosnia and Herzegovina, which hosts 20.9 million tonnes of ore with average grades of gold, silver, copper, lead, and zinc. In other words, this is an underexplored area from a mining and geological perspective, whose value and long-term potential have not yet been established.

New Soil Sampling Results

The latest results from the Bobija project relate to the wider Tisovik area, where expanded soil sampling confirmed the presence of large, interconnected geochemical anomalies of silver, lead, zinc, and antimony. Compared with earlier stages, the key new development is the significantly broader spatial extent of these anomalies, suggesting that the mineralization signal is not localized but distributed across multiple connected zones.

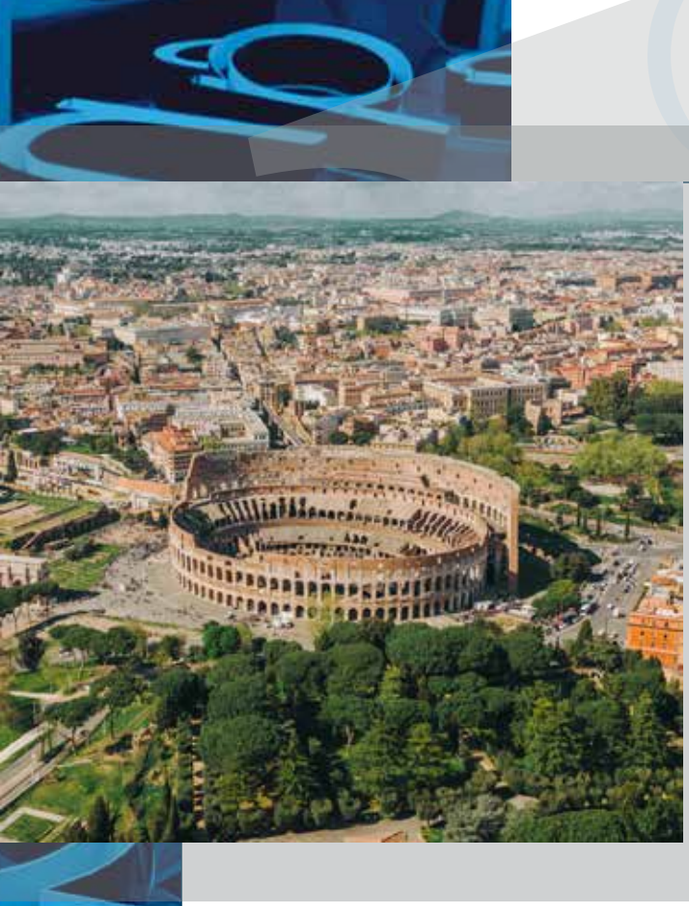
According to the company's statement, anomalies were identified over approximately five kilometers along an east-west trend across the target zones of Tisovik, Crvene Stene, and Kozila. This continuity, combined with the simultaneous presence of multiple metals, points to the possibility of a more developed polymetallic system than previously confirmed in the field.

Key new data include peak values from soil samples of up to 7.1 g/t silver, 4,685 ppm lead, 969 ppm zinc, and 1,049 ppm antimony. The company says these results support an interpretation of a robust polymetallic system, while emphasizing that this remains a geochemical-stage exploration program, and that the full significance of the findings will depend on the next exploration steps.

A new sampling campaign has been announced for March 2026, aimed at testing the extensions of anomalous zones across a large area that remains unexplored to date.

Energy Portal

Photograph: Unsplash/Shane Mclendon



ROME TO GET A MODERN WASTE MANAGEMENT SYSTEM

With the construction of a complex of facilities known as the Circular Resources Park, along with two organic waste treatment plants and two paper and plastic recycling facilities, Rome will gain a new integrated waste management system.

According to a statement by the City of Rome, this project will enable the Italian capital to independently close the entire waste management cycle, improve waste collection services, and significantly reduce the need to transport waste outside the city. This will result in a more stable system, faster waste processing, and substantial financial savings for both the city administration and residents.

The project is particularly important for strengthening recycling and reducing reliance on landfills and waste treatment facilities in other European cities—an issue that has long been one of the biggest challenges in Rome's waste management system.

Rome's Mayor, Roberto Gualtieri, stated that the project represents a turning point for the city.

"Rome is finally gaining the ability to manage its own waste independently. The new system will bring more efficient services, higher rates of separate waste collection, and long-term savings, while meeting high environmental standards," Gualtieri said.

The implementation of the Circular Resources Park is considered one of the key infrastructure projects for Rome's sustainable development in the coming years.

Energy Portal

START OF FOUNDATION CONCRETING FOR PAKS II

In Hungary, the start of concreting works for the reactor building foundation slab of the Paks II project has been marked, moving the project into the status of a nuclear power plant "under construction."

As we previously reported, Paks II envisions the construction of two new VVER-1200 units (Units 5 and 6) as an expansion of the existing Paks Nuclear Power Plant. According to available data, the foundation slab will require around 43,000 cubic meters of reinforced concrete, and the concreting works are planned throughout the entire year.

The Paks site is located about 100 kilometers south of Budapest. The existing plant consists of four units commissioned between 1982 and 1987, while the intergovernmental agreement on the new units was signed in 2014.

The construction license was issued in 2022, and an earlier agreed framework plan foresees the new units being connected to the grid in the early 2030s. At the end of 2025, the Hungarian regulator issued permits for the start of first concrete works for future Unit 5.

Energy Portal

Photographs: (left) Unsplash/Spencer Davis; (right) Pixabay/Markus Distelrath

65 percent

of Greece's energy mix comes from renewable energy sources.

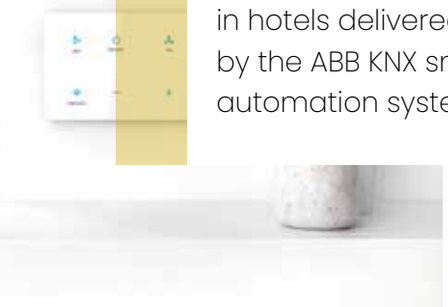
[PAGE 6]

20–40 percent

energy savings

in hotels delivered by the ABB KNX smart automation system.

[PAGE 30]



ABB

21,552 AIKO Solar panels

to be installed as part of the B2 SUNSPOT 2 power plant.

[PAGE 62]

Advanced digital substation

TS Bor 6 delivered by the Siemens Smart Infrastructure team in cooperation with Elektromreža Srbije.

[PAGE 24]

SIEMENS

CrossWaste project

focused on construction waste management launched by the Municipality of Brod.

[PAGE 16]

Photographs: (top) Pixabay/Palmeris; (middle left) ABB; (middle right) AIKO; (bottom left) Siemens; (bottom right) Selmir E Žepč@n

5,000 m³
of the Činkina ćuprija canal cleaned as part of the project "Revitalization of Umbra Habitat in the Kraljevac Special Nature Reserve."

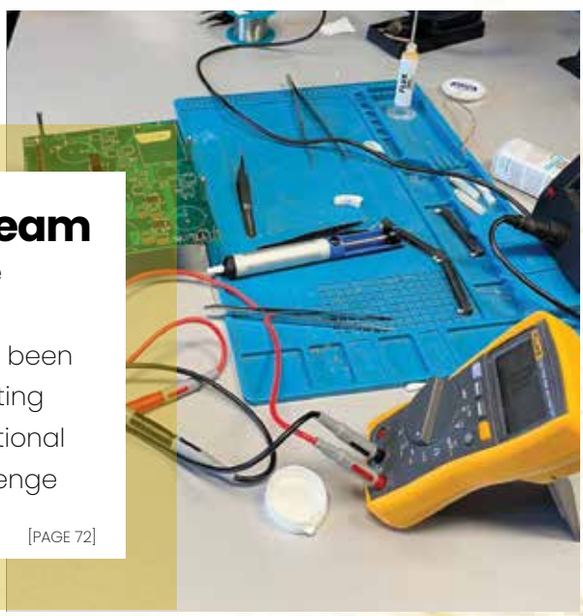
[PAGE 88]

New digitalization regulations
are currently being developed in Serbia, with a particular focus on e-business, digital administrative procedures, and the adoption of accompanying secondary legislation.

[PAGE 12]

The Association of Serbia's Energy-Intensive Industry
brings together leading companies from the steel, cement, and fertilizer sectors to jointly contribute to the creation of energy and climate policies.

[PAGE 32]



H-Bridges team
develops innovative solutions in power electronics and has been successfully presenting them at the International Future Energy Challenge (IFEC) for years.

[PAGE 72]

190,000 tons
of carbon dioxide emissions reduced by Titan Group over the past five years.

[PAGE 36]

Photographs: (top left) Geza Farkaš; (top right) Ministry of Mining and Energy of the Republic of Serbia; (middle) Unsplash/Peter Werkman; (bottom left) H-Bridges: (bottom right) Titan Group

CHALLENGES, INNOVATION, AND SUSTAINABILITY: EKC THREE DECADES LATER

Founded in 1993, at a time of profound political and economic changes in the territory of the former Yugoslavia, the Electric Power Coordination Centre (EKC) was established in response to a key need – to ensure the secure, stable, and coordinated operation of power systems at a moment when new states and new power utility structures were being formed. Four power utilities from the region – Montenegro, North Macedonia, Republika Srpska, and Serbia – recognized a shared interest and vision and joined forces to establish EKC.

Today, more than three decades later, EKC has grown into a leading consulting and software company in the energy sector, recognized for its expertise, reliability, and deep understanding of regional and European energy flows. The company's vision is to preserve this recognition while continuously advancing by addressing energy transition challenges, embracing new technologies, and following industry trends.

The EKC team consists of experts from various fields of the energy sector, with a unique set of knowledge and skills that enable them to understand the needs of a wide range of clients – from transmission system operators and power utilities to regulators, investors, and equipment manufacturers. Years of close cooperation with its founders and industrial partners have enabled EKC to build not only profound technical expertise but also a distinctive market position: a combination of experience, innovation, and regional credibility.

Thanks to this unique legacy, EKC today represents a key partner in the development of sustainable, modern, and reliable power systems – both in the region and beyond.

Photograph: Pixabay/Gerd Altmann

"EKC's mission is to support the power sector and its Founders in operational activities and development by providing appropriate and modern solutions to their everyday challenges. The extensive knowledge and experience, combined with an exceptionally flexible, innovative, and agile approach of EKC's staff, enable us to overcome the various challenges that the energy transition places before our clients," explains EKC Director Branislav Đukić.

By respecting clients' needs and meeting their requirements, EKC fulfills its mission by implementing specific, tailor-made projects.

The main areas in which EKC operates today include:

- Electricity transmission and distribution
- Integration of new facilities into the power system and the electricity market
- Electricity markets and power portfolio management services
- Digital services, software, and algorithm development in the power sector
- Education and training for stakeholders in the power sector

How EKC Responds to Global Changes

The power sector is undergoing an accelerated global transformation driven by decarbonization, the strong penetration of renewable energy sources, and the development of advanced technologies. Traditional high-inertia systems are being replaced by networks dominated by solar power plants, battery systems, and inverter-based resources, creating new challenges for stability and system management. In such an environment, new models are emerging – from demand-side management to energy storage. As a consulting company, EKC remains technology- and vendor-neutral. It responds to market demands by combining its existing expertise with continuous acquisition of new knowledge.

When it comes to the integration of renewable energy sources, the greatest challenge is the massive penetration of inverter-based resources (IBR). Solar power plants, wind farms, and battery systems operate through inverters rather than synchronous machines. Unlike conventional generators, inverter-based sources lack natural inertia (which helps the grid "remain stable" during disturbances), and their behavior depends on manufacturers' control algorithms (software that governs their response to grid changes). They can react within milliseconds, significantly faster than conventional machines.

As a result, the transition toward grid-forming concepts (inverters capable of actively stabilizing the grid as virtual synchronous machines) is underway, along with a growing need for standardizing control algorithms.

In practice, the main challenges include declining system inertia, unknown interactions between inverters from different manufacturers (in the 1–200 Hz range), and the risk of resonances. Therefore, in addition to conventional RMS simulations (electromechanical domain), stability analyses increasingly require EMT simulations (electromagnetic domain). EMT simulations capture inverter behavior with high temporal resolution and allow realistic representation of fast control dynamics.

Typical challenges in renewable integration include redefining the minimum short-circuit power at the point of connection and coordinating voltage regulation between inverters and transformers. For this reason, in addition to fault analyses, it is important to verify interactions between IBR units and synchronous machines in the EMT domain. RRenewable integration is no longer only a matter of grid connection capacity, but increasingly a question of dynamic compatibility and system stability.

Digitalization as a Key Pillar of the Future Power System

Digitalization is becoming essential for managing increasingly complex power systems, particularly with the growth of distributed renewable resources and new market mechanisms. Fragmented and dynamic resources require advanced software platforms that enable timely and reliable decision-making.

"Future software platforms should be vendor-agnostic and based on open standards such as CIM/CGMES in order to overcome data silos and ensure interoperability across SCADA, EMS, and DMS environments. Power systems have historically evolved through heterogeneous platforms from different vendors, which often resulted in closed data silos and limited information exchange. Open and interoperable architectures are therefore essential for long-term sustainability and technological independence" explains Đukić.

The system's digital twin is becoming a central model for simulations, forecasting, and operational support, while cybersecurity is evolving into a fundamental design principle.

In conclusion, our interlocutor emphasizes that the role of software is shifting from a traditional tool for offline studies and system simulations to a platform supporting real-time power system operation. The combination of advanced simulations, digital twins, and AI-based analytics will enable system operators to assess risks more quickly, optimize system performance, and safely integrate an increasing share of renewable and distributed resources. Digitalization thus becomes a prerequisite for a stable, flexible, and sustainable energy sector in the future.

Prepared by Milena Maglovski

Ceefor

The Center for Energy Efficiency and Sustainable Development prepared the Detailed Design (Issued for Construction Design) and the As-Built Design documentation.

A ground-mounted solar power plant, B2 SUNSPOT 2, with an installed (grid connection) capacity of 9.9 MW, is under construction.

Photograph: MT-KOMEX

The solar power plant is planned in the settlement of Mokrin, within the territory of the Municipality of Kikinda, with Brankov Solar d.o.o. as the investor.

The project includes the installation of

21,552 AIKO Solar photovoltaic modules,

each with a rated power of 650 Wp.

The power plant will be equipped with

36 Huawei inverters,

each with a nominal capacity of 330 kW. The inverters automatically synchronize with the grid at 0.8 kV.

All generated electricity will be exported to the distribution system.

For the purposes of transformation and connection to the distribution network,

three 20/0.8 kV substations,

as well as one switchgear facility, have been designed.

The plant has been designed to optimize energy production. The photovoltaic modules are installed in a vertical (portrait) orientation on a supporting substructure with an adjustable tilt angle, adapted to the sun's position. The panels are mounted parallel to the horizontal ground plane and can rotate along the east–west axis, with an azimuth angle of 0°, thereby increasing overall system efficiency.

Photographs: (top right) AIKO; (middle left) MT-KOMEX; (middle right) Huawei; (middle bellow) MT-KOMEX; (bottom) PowerFit

SUSTAINABLE MOBILITY IN CROATIA: THE ROLE OF CITIES, ENERGY, AND DIGITALIZATION

The electrification of transport, the integration of renewable energy sources, and the application of digital solutions are no longer distant-future issues but concrete challenges facing local communities, decision-makers, and businesses across the region today.

We discussed these topics—as well as the realistic potential of sustainable mobility, institutional capacities, financial models, and the role of knowledge in a successful transition—with Vedran Kirinčić, Associate Professor and Head of the Department of Electric Power Systems at the Faculty of Engineering, University of Rijeka.

Q: Your professional biography is strongly associated with clean energy, sustainable mobility, and digitalization. How would you describe your current professional focus, and which projects are you involved in—both in Croatia and beyond?

A: My current professional focus is on linking the energy transition and sustainable mobility through concrete, implementable projects at the local and regional levels. As an energy transition consultant, I work on

Photograph: Tung Lam/Pixabay

developing investment concepts that integrate energy generation, transport electrification, and digital solutions into unified systems that are both technically feasible and financially sustainable. I collaborate with cities and municipalities on projects that integrate renewable energy sources, EV charging infrastructure, energy communities, and smart energy management. Through EU initiatives, I am also involved in projects across the wider region.

At the same time, as a member of the academic community, I place strong emphasis on knowledge transfer and capacity building for local and regional stakeholders—through numerous panels and workshops, as well as through a new university course, Energy Transition in the Transport Sector. Practical experience shows that without people and institutions that understand the system, there can be no long-term transition. My interest, therefore, always lies at the intersection of technology, finance, and real-world implementation.

Q: Sustainable mobility is becoming one of the key pillars of the energy transition. How do you assess the current state of sustainable mobility in Croatia, and where does it realistically stand in relation to the goals set by the EU?

A: Sustainable mobility in Croatia has made progress in recent years, but this progress has largely come through isolated initiatives rather than through systematically planned development. We are seeing an increase in the number of electric vehicles, the first more serious projects focused on the electrification of public transport, and investments in infrastructure; however, these advances are still not sufficiently integrated into the energy system or spatial planning.

In relation to the goals of the European Union, Croatia is currently lagging behind, primarily due to slower implementation and the lack of an integrated approach that would link transport, renewable energy sources, and grid infrastructure. From a technological perspective, solutions are available and well proven, but the key challenges remain in organization, financing, and capacity building at the local level. EU targets are extremely ambitious, yet achievable in the long term—provided there is a shift from high-level strategies to systemic, coordinated projects with clear operational and financial logic.

Q: What would you highlight as Croatia's greatest achievements in the field of sustainable mobility to date, and whose efforts have contributed the most to these results?

A: Croatia's greatest achievements in sustainable mobility are most visible where there has been a clear vision and strong personal commitment from individuals and teams at the local level, rather than merely formally adopted strategies. This is particularly evident in projects related to the development of public transport and mobility-on-demand services, the expansion of charging infrastructure, and pilot car-sharing systems, all of which have demonstrated that new solutions are technically and operationally feasible. It is important to emphasize that these advances are not the result of systemic mechanisms, but rather of the work of motivated local authorities, experts, and companies that assumed responsibility and successfully connected various stakeholders. These examples clearly show that success does not primarily depend on the regulatory framework, but on capacity, knowledge, and willingness to cooperate. Educated and motivated individuals represent the greatest value. Their projects should serve as a foundation for scaling up best practices and building a more long-term, coherent approach to sustainable mobility at the national and regional levels.

VEDRAN KIRINČIĆ is an Associate Professor and Head of the Department of Power Engineering at the Faculty of Engineering, University of Rijeka. As an energy transition consultant, he collaborates with both the private and public sectors, including numerous local communities. His expertise includes the preparation of various strategic and planning documents related to the green energy transition, such as the decarbonization of the transport sector through fleet electrification, with a particular focus on electromobility, renewable energy sources, and energy storage solutions. He is involved in conducting analyses of energy consumption patterns, identifying areas for efficiency improvements, and developing solutions to reduce carbon footprints. In addition, he has experience in preparing Sustainable Energy and Climate Action Plans (SECAP), Sustainable Urban Mobility Plans (SUMP), Sustainable Electromobility Plans (SEMP), as well as investment concepts for climate-neutral mobility. He is actively engaged in numerous projects aimed at promoting science and technology and is a co-author of a number of scientific and professional publications.

Photograph: courtesy of Vedran Kirinčić

Q: Looking ahead, what are your expectations for the development of sustainable mobility in Croatia by the end of this decade, and do you see room for stronger regional cooperation in the Western Balkans and Southeast Europe?

A: I expect sustainable mobility in Croatia to develop more rapidly than it has so far, primarily through further electrification of road transport and the strengthening of public transport, as well as through increasingly closer integration with the energy system. However, this development will not be linear and will inevitably involve certain missteps from which lessons will need to be learned. The key question will be how successfully we manage to move from isolated projects to systemic models that can be replicated and scaled. As for regional cooperation, the potential is significant, as countries in the Western Balkans and Southeast Europe share similar infrastructural, institutional, and financial challenges. Rather than developing similar solutions in parallel, a stronger exchange of knowledge, experience, and best practices could substantially accelerate the transition and reduce overall costs for all stakeholders involved.

Q: Renewable energy sources and mobility are increasingly being viewed as interconnected systems. What is your engagement in the field of renewables, and how do you see the interplay between the development of renewable energy and the electrification of transport?

A: I strongly advocate an approach in which renewable energy sources and mobility are developed as interconnected systems, rather than as two separate sectors. The electrification of transport only makes full sense if it is accompanied by local clean energy generation and smart demand management. For this reason, my projects—implemented in cooperation with technology solution providers—focus on photovoltaic systems on buildings and solar carports, integrated with electric vehicle charging infrastructure and, where justified, with energy storage systems. Such an approach reduces grid load, increases system resilience, and improves the economic viability of investments. I consider joint planning of energy and transport solutions to be essential, as only in this way can real climate impacts be achieved and the long-term sustainability of transport electrification be ensured.

Q: How do digital solutions contribute to more efficient, cleaner, and more accessible transport?

A: Digital solutions can make a significant contribution to more efficient, cleaner, and more accessible transport, but only if they are part of a broader systemic approach. Their real value lies in optimization—from smart management of electric vehicle charging and the reduction of peak grid loads, to better utilization of existing transport infrastructure.

We maintain close cooperation with companies developing solutions based on video analytics and artificial intelligence, for example, for monitoring traffic flows, identifying mobility patterns, and optimizing infrastructure use in real time, as well as through development plans for integrating digital services and EV charging within parking systems. Such solutions enable data-driven decision-making, rather than decisions based on assumptions. It is crucial, however, that digitalization does not remain an isolated technological layer but is integrated with the energy system, spatial planning, and users' actual needs. Only then can digital solutions deliver their full contribution to sustainable transport.

Q: If you had to deliver one key message to policymakers, businesses, and citizens—what should each of them

The transition to sustainable mobility is not a matter of sacrifice but an opportunity to build a higher-quality, cleaner, and more accessible mobility system that delivers greater resilience and a better quality of life in the long term

Photograph: Solar Park

do already today to ensure a faster and more effective transition to sustainable mobility?

A: To policymakers, I would emphasize the importance of developing solutions tailored to the local level, with clearly defined implementation and financing logic. The complexity of sustainable mobility and energy transition challenges requires close cooperation with multidisciplinary expert teams whose experience can contribute to solutions aligned with the real needs of local communities. High-quality planning and project documentation should form the basis for action, followed by a strong and structured effort to secure funding, primarily through available European and other funding mechanisms.

To the business sector, my message would be not to view sustainable mobility solely as a regulatory obligation, but as a long-term business opportunity—provided it is supported by realistic models that integrate energy, infrastructure, and cost management. To citizens, I would emphasize that the transition to sustainable mobility is not a matter of sacrifice but an opportunity to build a higher-quality, cleaner, and more accessible mobility system that delivers greater resilience and a better quality of life in the long term.

Q: Projects related to sustainable mobility and renewable energy often face difficulties during the implementation phase. Based on your experience, what are the main reasons for this, and what could be done differently?

A: The most common reasons why projects stall during the implementation phase are not technical in nature, but rather related to organizational and financial aspects. Projects are often developed to meet programmatic or political objectives without a sufficiently elaborated long-term operational logic—particularly regarding management and maintenance costs. An additional challenge is the lack of capacity at the local level, where experience in managing complex, interdisciplinary projects is often limited.

I believe the solution lies in earlier involvement of practitioners, more realistic financial analyses, and strengthening local teams through education and mentoring support.

Q: To what extent are today's investment and financing models adapted to the development of sustainable mobility and local energy projects?

A: Current investment models are still not fully adapted to the specific characteristics of sustainable mobility, especially at the local level. They are often too fragmented and rely almost exclusively on grants, without a clear strategy for long-term financial sustainability. Sustainable mobility requires models that integrate energy generation, infrastructure, and services, with a clear allocation of risk between the public and private sectors. I believe there is a need for more flexible forms of public–private cooperation, as well as for the development of investment concepts that are both understandable and bankable. EU funds should remain a strong driver, but not the sole source of financing. In the long term, sustainable projects must have clear revenue streams and controlled operational costs.

Q: How institutionally and in terms of human resources prepared are cities and municipalities today to manage complex sustainable mobility and energy projects?

A: The readiness of cities and municipalities to manage complex projects varies significantly, but in most cases, there is a gap between ambition and actual capacity. The local level often demonstrates strong motivation and political will, yet lacks specialized expertise, experience in financial planning, and the operational capacity required for long-term project management. This is particularly evident in integrated projects that combine energy, mobility, and digital solutions.

I believe it is crucial to invest systematically in strengthening local teams through education, knowledge exchange, and hands-on work on concrete projects. In the long run, empowering the local level represents one of the most important levers for a successful energy and transport transition.

Interview by Milena Maglovski

Photograph: Qelo

WE BUILD SOLAR POWER PLANTS TOGETHER, WE BUILD THE FUTURE

- **MT-KOMEX BH**, as part of the group **MT-KOMEX d.o.o. Belgrade** is one of the leaders in the design and construction of solar power plants, with extensive experience and numerous successfully completed projects.
- The company actively supports clients in preparing for the changes introduced by the CBAM mechanism, offering guidance in meeting new regulatory requirements through concrete steps and expert consulting.
- By transitioning to solutions that reduce carbon dioxide emissions, we help pave the way toward sustainable operations and the green transition.
- Our team of experts provides a comprehensive turnkey approach, covering every stage of the project – from planning and power plant design, through equipment delivery and construction, to system functionality testing and maintenance.
- We believe that solar energy is the right solution for achieving energy independence – see for yourself.

MT-KOMEX BH
ENERGY SOLUTIONS D.O.O.

www.mt-komex.ba
info@mt-komex.ba
+(387) 64 **40 26 295**

HOW THE GREENFIELD PROJECT IS TRANSFORMING STUDENTS' ENVIRONMENTAL AWARENESS

When a volunteer initiative grows into a movement that brings together generations of students, you know that something worth noticing is taking shape. This is precisely the story behind the student project Greenfield, about which we spoke with Ana Vrbica, a student at the Faculty of Economics and an active member of the initiative that has been raising environmental awareness among young people in recent years.

Ana takes us back to 2022, when it all began with a panel discussion titled, symbolically, 'Why Would Anyone Be Eco?' As she explains, Stefan Nevistić, then a member of the organization, presented the idea that each of us can be an agent of change—even through small gestures —in an inspiring way.

— In the first year, our colleagues immediately put theory into practice by organizing a trip to Divčibare, which became a concrete first step toward everything that followed, Ana explains.

That initial enthusiasm did not remain confined to the first generation of participants. On the contrary, it spread, inspired new members, and gradually evolved into increasingly ambitious and tangible activities year after year. Today, Greenfield stands behind cleanup actions in Ovčar Banja and Subotica, as well as numerous initiatives organized at the Faculty itself.

— What motivates us most are the small changes we initiate each year, which over time lead to significant results, Ana says.

As a student organization, Greenfield members feel a particular responsibility to bring environmental protection closer to young people and, through their own example, demonstrate that solidarity can go hand in hand with ecology. At the Faculty of Economics, they regularly organize humanitarian collections of

Photographs: Greenfield

recyclable materials and are especially proud of their volunteer cleanup campaign at Mount Avala.

This year, they have taken a step further: alongside recycling efforts, they have launched a collection of used 'Terea' tobacco sticks, empty cigarette packs, and similar packaging, which they donate to the association Naša kuća (Our House), an organization that provides support to persons with developmental disabilities.

— This association supports individuals with developmental disabilities, and we are extremely pleased that through this project we can help them and contribute to raising awareness about their position in society, our interlocutor emphasizes.

Success Measured by Student Engagement

For Greenfield, one of its greatest achievements is the fact that it has succeeded in mobilizing a large number of students who had long wanted to contribute but lacked a clear opportunity to do so.

— With the support of the faculty, in 2024, we organized our first recycling campaign, which resulted in the purchase of essential equipment for those who needed it most, Ana says.

That moment clearly demonstrated that environmental awareness among students not only exists, but is simply waiting for the right impulse to be expressed. This year, several new initiatives are being introduced in response to the growing support the project receives with each cycle.

Although Greenfield does not currently have formal cooperation with other faculties, invitations for joint actions have already been extended. Ana emphasizes that they are open to partnerships and would welcome the opportunity to join forces with other student organizations in the future.

When it comes to companies, cooperation has already been established and continues year after year. The project is supported by numerous firms that recognize the importance of raising environmental awareness, and Greenfield is committed to nurturing and expanding these partnerships.

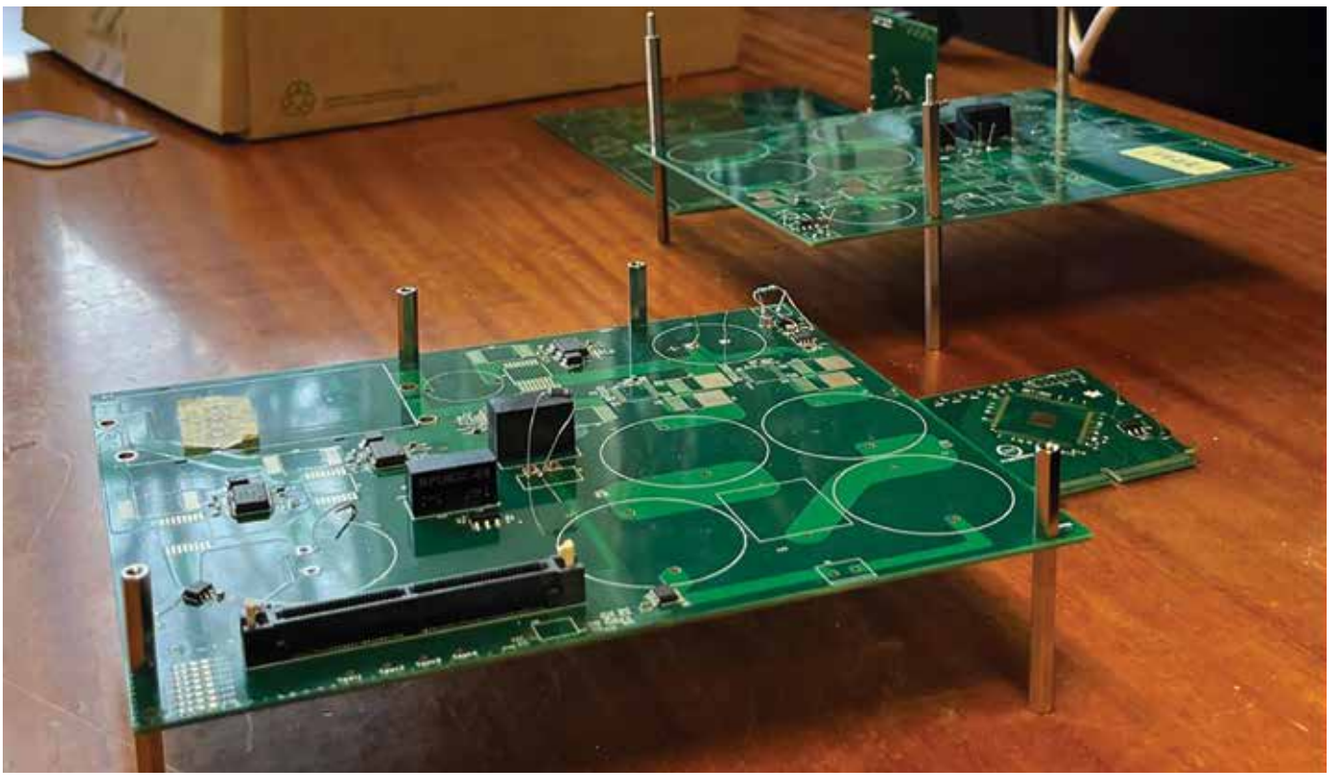
Asked where she sees the project in the coming years, Ana responds with optimism:

— We hope that future generations will continue in our footsteps, while also further developing the project through new ideas, initiatives, and actions. Our goal is to organize conferences featuring experts in ecology to show young people that even seemingly small changes in everyday behavior can make a significant difference. We would also like to carry out tree-planting initiatives and contribute to improving certain areas in Belgrade and other cities across Serbia.

Most importantly, she adds, the project must remain alive and maintain continuity. Cleanup actions, recycling, and raising awareness about responsible behavior toward nature remain the core pillars of Greenfield.

— We believe that continuity and dedication are the key to real change, Ana concludes.

Prepared by Milena Maglovski



THE H-BRIDGES TEAM AND LABORATORY AS THE FOUNDATION OF DEVELOPMENT

The H-Bridges team of students from the Faculty of Electrical Engineering, University of Belgrade, has, for many years, been developing innovative solutions in the field of power electronics and successfully presenting them at the prestigious global competition, the International Future Energy Challenge (IFEC), under the auspices of the IEEE. Over the past few years, the team has achieved notable results, including winning 1st place in 2019, as well as second places in the 2020, 2022, and 2023 competitions. The winning team in 2019 developed a drive system for an electric bicycle and an Android application for communication between the cyclist and the electric drive. More information about previous successes and projects can be found on the H-Bridges team website.

Behind these results stand students who, alongside their regular academic obligations, spend months developing complex engineering systems, often spending evenings and weekends in the laboratory. In addition to the technical aspect, given that competition rules require teams to independently secure funds for prototype development and participation, being part of such a project offers students significant experience, enabling them to work in a multidisciplinary team, strengthen teamwork, and develop entrepreneurial skills.

Photographs: H-Bridges

The team's work takes place within the Laboratory for Digital Control of Converters and Drives at the Department of Power Converters and Drives. This laboratory serves as a research and educational base for developing and applying modern digital control methods for power converters and drive systems. The focus includes the design and implementation of algorithms for current, voltage, and torque regulation, as well as systems that ensure high power quality and stable operation under real conditions.

With the growing share of variable renewable energy sources and the increasing role of electric vehicles, the need for the digitalization of energy systems is becoming essential. At the same time, power electronic devices represent an indispensable part of such systems. It is precisely in this environment that students connect theory, modeling, and practical implementation, developing prototypes that integrate digital control platforms, control algorithms, and real-time measurements — technologies that are today standard in modern power engineering. In addition to working on competition projects, a certain number of students continue cooperation with the laboratory through bachelor's and master's theses under the mentorship of Assistant Professor Aleksandar Milić, deepening their knowledge in the field of control of power converters and drive systems.

Current Project

This year's team task is the design of a bidirectional on-board charger for electric vehicles. The project responds to the need for solutions that enable not only battery charging but also energy feedback from electric vehicles to the power grid, thereby making electric vehicles an active element of the energy system.

The competition requirements include a power rating of 1 kW, a power density of 2 kW/L, plug-and-play functionality, and a minimum efficiency of 92 percent at nominal power. These criteria set a high technical standard and require careful design of the topology, control strategy, and protection system. In addition, the dimensions of the prototype are limited to achieve greater compactness.

This year, the H-Bridges team consists of 25 members and is organized into three sub-teams: Hardware, Firmware and Control, and Public Relations and Fundraising. Development has entered the phase of intensive laboratory testing of the prototype, which includes verification of protection functions, measurement of key electrical parameters, and final optimization of the control system, as well as analysis of the system's dynamic behavior, verification of control stability, and performance assessment under different operating modes. In parallel with technical activities, the team independently secures the funds necessary for participation in the next phase of the competition.

The competition consists of qualification, semifinal, and final rounds. After submitting a technically elaborated proposal, the H-Bridges team received confirmation of its placement in the semifinals at the end of December 2025. The explanation of the decision highlighted the clear structure of the document, the technical elaboration of the solution, the well-argued selection of the topology and control strategy, and the innovation and economic analysis of the project, which particularly contributed to its credibility.

The semifinal will be held in March 2026 in San Antonio, USA, during the IEEE APEC conference, where teams present technical results and progress. Placement in this phase represents a significant success for the team and the University of Belgrade, considering that H-Bridges competes on equal terms with universities from around the world. The final stage of the competition will be held in Belgium, at the Catholic University of Leuven.

H-Bridges

SOLAR FLEX CROATIA 2026: FLEXIBILITY AS THE FOUNDATION OF THE ENERGY TRANSITION

As part of the European campaign Let's Flex, launched in 2025 by SolarPower Europe, the second European conference Solar Flex Croatia 2026 will be held on March 17, 2026, at the Sheraton Hotel in Zagreb. The event is jointly organized by Renewable Energy Sources of Croatia (OIEH) and SolarPower Europe (SPE).

Solar Flex Croatia 2026 connects analysis, practice, and policy to develop a more flexible power system. The central part of the conference will be the presentation of the national study "Identification of Grid Congestion Locations in the Power System and the Need for Battery Energy Storage Systems in the Republic of Croatia." This study represents an important analytical foundation for strategic grid development planning and for directing future investments in energy storage systems.

During the previous summer, Croatia imported approximately 25 percent of its electricity, partly due to limited energy storage capacity. The targeted and planned deployment of battery systems has the potential to relieve pressure on the power infrastructure, enhance the security of supply, and enable better utilization of domestic electricity generation from renewable energy sources.

Solar Flex Croatia 2026 Conference Program

CRO Flex: From Grid Congestion to Battery Solutions – The central segment of the conference will be dedicated to the results of the national study "Identification of Grid Congestion Locations in the Power System and the Need for Battery Energy Storage Systems in the Republic of Croatia," prepared by the Energy

Illustration: OIEH

Institute Hrvoje Požar (EIHP) and the Faculty of Electrical Engineering and Computing (FER) of the University of Zagreb, with the support of the European Bank for Reconstruction and Development (EBRD).

The study aims to identify critical congestion points in the Croatian power system and define the needs and optimal locations for battery energy storage systems. In addition to technical recommendations, the document provides guidelines for amendments to the legislative and regulatory framework to integrate battery systems further, enhance their market viability, and accelerate the integration of renewable energy sources into the grid. Through presentations and a panel discussion, key issues will be addressed regarding system flexibility, the role of batteries in renewable integration, and the future development of Croatia's power grid.

Energy Storage: More Than Batteries – This segment of the conference broadens the focus beyond battery technologies and opens discussion on the roles of storage and pumped-storage hydropower plants, hydrogen, and the integration of biomethane and hydrogen into gas infrastructure. Special emphasis is placed on their role in managing variable renewable generation, reducing peak loads, and improving energy system reliability.

The goal of this part of the program is to demonstrate how different storage technologies can jointly contribute to a more stable, resilient, and efficient energy system based on renewable sources, and how their coordinated deployment can support long-term decarbonization, energy self-sufficiency, and security of supply.

Active Consumers: Contributing to a More Flexible Grid – The third part of the conference focuses on the active role of consumers, from industry and entrepreneurship to households. Through practical examples, the importance of demand-side flexibility is examined, including demand management, virtual power plants and aggregators, battery systems, heat pumps, microgrids, and the integration of generation and consumption at the point of use.

A special presentation will introduce a green tariff model designed for active customers and prosumers who simultaneously produce, exchange, and consume electricity. This approach creates space for fairer grid tariffs, encourages local production and consumption, and enables more efficient integration of distributed renewable sources into the power system.

Photograph: OIEH

What Flexibility Represents

Flexibility refers to the ability of electricity consumption and generation, as well as other technologies such as energy storage, to adjust their operations in response to grid needs or energy availability. This enables optimal and targeted planning of investments in grid infrastructure development.

Solar Flex Croatia 2026 focuses on strengthening power system flexibility through broader deployment of energy storage solutions, enabling safer and more efficient integration of an increasing share of renewable energy sources into the grid. At the same time, the event serves as a platform for exchanging knowledge, experience, and best practices, as well as for connecting with decision-makers, regulators, industry representatives, and potential partners.

Solar Flex Croatia 2025

The first edition of the conference, Solar Flex Croatia 2025, was dedicated to power system flexibility and was organized by Renewable Energy Sources of Croatia. It was held within the framework of the European Let's Flex campaign led by SolarPower Europe, making Croatia the first country to present this initiative through a national event. The conference served as a model for expanding the initiative to other EU Member States, including the Czech Republic and Italy, which launched their own editions of Solar Flex conferences this year.

The first conference gathered more than 300 participants from industry, the financial sector, regulatory bodies, and relevant institutions, confirming the need for structured discussion on grid flexibility, energy storage, and renewable energy integration.

Prepared by Milena Maglovski

THE LINK BETWEEN LAUNDRY AND ECOLOGY

Microplastics have undoubtedly become a widely discussed topic in recent years—not because environmental awareness is currently "trendy," but because it has become fundamentally clear how pervasive microplastics are and how difficult they are to remove once they enter ecosystems. Part of this pollution originates from an entirely ordinary daily routine: doing the laundry. When we wash fabrics, especially synthetic ones, microscopic fibers are released and carried away with wastewater—tiny, dispersed, and practically invisible.

Synthetic fabrics are man-made textiles produced in factories from polymers, which are then processed into fabric. Clothing labels commonly list materials such as polyester, polyamide, acrylic, Lycra, and similar substances. During washing, these materials can shed into microscopic fragments that then travel further through wastewater systems.

To address the problem at its source, microfibers must be captured directly during washing, before the water enters the sewage system. This is the principle behind Regen, a filtration technology developed by the Bristol-based British company Matter. In laboratory conditions, filtration proved relatively straightforward, but real challenges emerged once more demanding washing loads were tested. Versions that appeared stable under controlled conditions began to fail when exposed to substances commonly present in real wash water, such as oils, skin residues, detergents, and grease. These create mixtures that are exceptionally effective at clogging filters. Sediment forms easily as fibers entangle, while particles fill micropores, causing fine-pore filters to rapidly lose flow.

Although filters capture fibers from all types of fabrics, the greatest

Photograph: Pixabay/Thomas G.

environmental risk associated with microplastics arises from synthetic materials. Cotton fibers are more biodegradable, although they also burden wastewater systems and can carry chemicals used in textile processing.

For this reason, Matter believes that the solution cannot be "just another filter," as sustainability would then cease to be the core principle—replacing one form of waste with another through new disposable valves and membranes. The central idea is to avoid additional resource consumption, which is why the technology was also designed not to require additional water. Moreover, frequent maintenance tends to frustrate users, and in a world saturated with information and obligations, people easily stop using devices that inconvenience them or simply bypass them altogether.

How does Regen work? During washing, the filter captures material within a specific zone, thereby keeping most of the membrane clean until the system approaches saturation. A sensor then detects that the filter is nearing blockage and activates the Regen function. A dedicated valve has also been introduced so that, even if the filter becomes fully saturated mid-cycle, the washing machine can still complete the wash. This prevents the filter from becoming a point of failure within the household. The captured material is easily removable, and the filter is not filled with water during emptying, thereby maintaining hygiene.

During washing, the filter captures material within a specific zone, thereby keeping most of the membrane clean until the system approaches saturation

Regen is primarily designed for integration into washing machines, but it can also be used as an add-on filter. As a technology, however, its application is not limited to household washing machines—it can serve as a solution across the entire chain, from households and professional laundries to the textile industry itself. The system is not limited to washing machines; it can also be applied at the fabric production stage in textile factories, where large volumes of wastewater are generated during material production and processing.

By 2030, Matter aims to develop and deploy sufficient solutions—both in the textile industry and in laundry applications—to collectively capture 15,000 tons of microfibers. Broader adoption of these systems in households, laundries, and factories would prevent an equivalent amount of microfibers from entering wastewater systems and ultimately the natural environment.

New standards emerge only when an environmental solution becomes invisible in everyday life—when it operates reliably and requires no additional effort or resources. Only then do such solutions become the new normal.

Prepared by Milica Vučković

EUROPE IS BUILDING THE FUTURE OF ENERGY THROUGH DIGITAL TWINS

Digital Twin (DT) technology, gradually becoming a key platform for both transmission system operators (TSOs) and distribution system operators (DSOs)

The European power system is undergoing the most profound transformation in its history. At the same time, we are facing accelerated electrification, rapid growth of renewable energy sources, and increasingly unpredictable climate conditions, while global security and geopolitical pressures continue to intensify. In such an environment, digitalization is no longer an option—it has become the foundation for system stability, resilience, and successful energy decarbonization.

At the heart of this digital revolution lies **Digital Twin (DT) technology**, which is gradually becoming a key platform for both transmission system operators (TSOs) and distribution system operators (DSOs) in their operational and planning activities.

DSO Entity and ENTSO-E have jointly published a new report on TSO–DSO digital twin use cases and digital twin solutions, developed within the Joint Working Group on the Digitalization of the Energy System Action Plan (DESAP). DESAP is a joint initiative of European transmission and distribution system operators, launched to accelerate the digital transformation of the power sector. This platform brings together experts from DSOs, TSOs, and European institutions to define digitalization priorities, develop common standards, improve data exchange, and support the advancement of technological solutions—among which digital twins play a central role.

The new DESAP report, therefore, marks a turning point: for the first time, the European energy system is moving from mapping challenges to defining concrete actions and practical use cases for DT technologies.

What Is a Digital Twin?

A digital twin is a dynamic virtual equivalent of a physical system, process, or asset within the power grid. Unlike conventional simulations, it is continuously connected to its physical counterpart through real-time data exchange, enabling it to reflect the system's actual state, respond to changes, and serve as a living model for advanced analysis, forecasting, and optimization.

Within the European power system, digital twins are becoming a key technology for both transmission and distribution operators. By

Illustration: ChatGPT Image

integrating data from smart meters, sensors, and field inspections, digital models are continuously updated and support decision-making—from predicting issues and simulating scenarios to optimizing operations and planning the entire asset lifecycle.

Digital twins can be local, focusing on individual assets, or integrated to encompass entire networks. Although large-scale integration remains largely at the conceptual stage, the objective is to develop an interconnected ecosystem of digital twins across different organizations, operating under shared standards and governance frameworks.

Why Digitalization Is Essential

The European power sector is undergoing profound changes driven by decarbonization, the growth of renewable energy sources, and increased consumer engagement. Digital twins are becoming essential in this context, as they provide enhanced system visibility, advanced predictive analytics, and the interoperability required for stable and efficient networks.

At the same time, power systems are facing challenges such as the large-scale integration of distributed energy resources, electrification of transport and heating, climate change, geopolitical instability, and cybersecurity risks. For these reasons, digital twins represent a cornerstone of a resilient and flexible energy system of the future.

Existing Initiatives and the Need for Coordination

The development of digital twins in Europe does not start from scratch—numerous initiatives and research projects are already underway. It is therefore important to clearly map the existing landscape to avoid duplicating efforts and to define the areas where digital twins can deliver the greatest added value.

An important component of the future digital infrastructure is the concept of data spaces. These enable data exchange between organizations while ensuring trust, security, and data sovereignty. Although they are not digital twins themselves, they provide the essential foundation for scalable and interoperable DT solutions.

Currently, several initiatives in the European energy sector are developing data space concepts, all aimed at enhancing secure, efficient data exchange among stakeholders. While their importance has already been recognized, these platforms still face the challenge of evolving into fully industrial-grade, robust systems with clearly defined technical standards, governance models, financial sustainability mechanisms, and accountability frameworks.

One of the leading initiatives is EDDIE, a pan-European open-source infrastructure that enables service providers to more easily integrate and access distributed data from households, distributed generation sources, and consumption data. In doing so, it creates the preconditions

TwinEU is a key strategic investment by the European Union to develop a pan-European digital twin architecture for the power grid

Photographs: (top) Unsplash/Casey Horner; (middle) Unsplash/Raphael Cruz; on the next page: (middle) Unsplash/Markus Spiske; (bottom) Unsplash/Anton Dmitriev

for cross-border energy services and cost-effective innovation.

OMEGA-X represents another significant example—a federated, multi-vector marketplace for data and services that simultaneously covers electricity, gas, and heat. It supports distribution and transmission operators, small and medium-sized enterprises, and large energy systems through standardized data exchange and multi-vector flexibility solutions.

The SYNERGIES project is developing a reference energy ecosystem focused on prosumers, network operators, and cross-sector use cases. It integrates building data, mobility data, smart metering information, and operational datasets to enable advanced flexibility services and coordination between TSOs and DSOs.

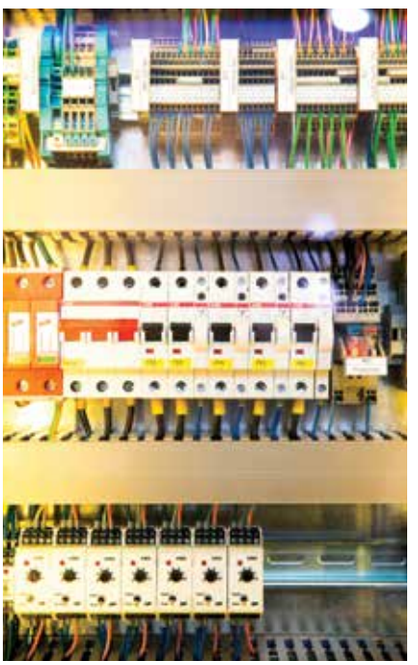
DATA CELLAR is an initiative designed for local energy communities that integrates smart metering data, meteorological information, and consumption, production, and price data into a unified, federated system. It also incorporates AI-based tools and incentive models to enable communities to develop their own energy services and participate in the market sustainably.

The ENERSHARE initiative demonstrates in practice how energy data spaces can support operational grid management, flexible services in mobility and electric-vehicle integration, and the participation of infrastructure from other sectors, such as water systems—all within secure, standardized, and sovereign data exchange frameworks.

The particularly ambitious INSIEME project goes beyond existing solutions. Its goal is to connect fragmented platforms into a unified Common European Energy Data Space (CEEDS) based on a federated architecture. Acting as an "integrator of integrators," INSIEME develops key CEEDS components and implements them through numerous use cases and pilot projects across at least 16 countries. It covers a wide range of domains—from energy efficiency, flexibility management, and collective self-consumption, to grid services, electromobility, renewable integration, and sector coupling. More than 60 partners are involved, including DSOs, TSOs, agencies, universities, startups, and leading energy companies.

TwinEU is a key strategic investment by the European Union to develop a pan-European digital twin architecture for the power grid. Rather than pursuing a single, centralized digital twin model, TwinEU adopts a federated approach that connects multiple local digital twins into a coherent European system. This strategy is being tested through eight large-scale pilot projects involving transmission and distribution operators, market operators, and technology providers.

Although each pilot addresses specific local and regional priorities, collectively they contribute to the development of pan-European scenarios and a unified vision of the digitalized grid of the future. For digital twins to become a functional part of the power ecosystem, operators must define clear integration requirements that align with their systems and operational needs. In this way, pilot projects can evolve into a stable and interoperable digital environment operating at the European level.



Prepared by Milena Maglovski

CARDBOARD REVOLUTION: FIVE YEARS OF THE FIGHT FOR WATER, AIR, AND PUBLIC GOODS IN BOSNIA AND HERZEGOVINA

The movement "Karton revolucija" was founded five years ago in Tuzla, determined to fight for dignity and against injustice, as well as for the right to water, air, and food. The founders of the movement, Adi Selman and Nedim Musić, say that it is currently the most visible activist movement in Bosnia and Herzegovina, bringing people together around the idea that laws must be applied equally to everyone and that public goods must not be privatized, usurped, or devastated.

Their activism began in 2020, when the campaign for local elections began, and Tuzla faced an urgent problem: the mammography machine was not functioning. After the elections, the problem was quickly forgotten, and everything continued "as usual," so they decided to organize and fight to ensure that women in this city receive adequate healthcare.

They emphasize that it depends on all of us whether systemic changes will occur and whether, in the future, our children and we will have the right to live and survive in this region.

— We believe that the time is coming when the influence of our movement, as well as all the other people with whom we share a vision for the future of Bosnia and Herzegovina and the region, will continue to grow. We believe that citizens are becoming more aware of the situation they are in day by day. Until a few years ago, it was unimaginable that anyone would oppose foreign mining companies, domestic politicians, and tycoons who want to exploit our nature for their own profit. However, today, across the entire territory of BiH, we see resistance — resistance from ordinary people — and it is growing stronger every day. This is precisely an indicator that people are becoming aware of the threat to our right to water, air, and food, and to biological survival; therefore, public

Photographs: Cardboard Revolution

perception has changed significantly — said members of "Karton revolucija" for the Energy Portal Magazine.

In the past six months, they have implemented numerous campaigns, mostly aimed at preserving natural resources, and have significantly raised awareness and alerted the public, considering that the movement currently has more than 360,000 followers on social media and an annual reach exceeding 70 million.

— Some of the activities we have carried out recently include: successfully stopping the project of RDF waste incineration at the Tuzla Thermal Power Plant. We established oversight of logging within the Protected Landscape "Konjuh." We initiated that the cities of Lukavac, Srebrenik, and Živinice adopt decisions opposing the opening of critical mineral raw material mines in their territories, for which they had initially given consent, and which were included in the Draft Spatial Plan of Tuzla Canton. Together with the citizens of Tuzla Canton, we successfully carried out a strong campaign opposing these projects within the Spatial Plan, they stated.

In addition, they initiated the process of declaring the "Treskavica – Bistrica Canyon" area protected on the side of Republika Srpska and will soon launch the same initiative within the Federation. Together with citizens in Kupres, they initiated the annulment of the environmental permit. They halted the project to open a magnesium factory in Kupres, and they are currently continuing activities that, as they say, will lead to its final abandonment. They have taken the first steps toward protecting the Neretva Canyon, initiated legal proceedings and criminal complaints regarding illegal construction in the area of the Prokoško Lake Natural Monument, contributed to opposition against the opening of an antimonite mine in Fojnica, and have taken many other actions.

From all the negative examples that have occurred so far, we can draw lessons and, together, save the remaining parts of the country that have not yet been destroyed, for which there is still an opportunity to be preserved

They emphasize that, as a movement, they are not opposed to economic development or to the use of natural resources for energy production.

— However, what is happening in BiH is a classic example of anarchy, or rather betrayal and destruction. We have become a mining colony that sells our natural resources and the health of our people to foreign companies. The best example of this is Vareš. Rivers are being dammed without any logic, and individual profit is the only thing that matters. Institutions are either incapable or unwilling to act in the interest of citizens. Wind parks, such as those in Tomislavgrad, are being built without appropriate legal regulations or completed studies, and are entirely funded by private investors who generate enormous profits. At the same time, our country is left with nothing but devastated and destroyed nature, they emphasize.

They add that, from all the negative examples that have occurred so far, we can draw lessons and, together, save the remaining parts of the country that have not yet been destroyed, for which there is still an opportunity to be preserved.

Prepared by Jasna Dragojević

STATUS AND OUTLOOK OF BATTERY ENERGY STORAGE SYSTEMS IN THE EU

Europe is rapidly shifting toward renewable energy sources. Still, along this path, one question is becoming increasingly critical: How to ensure power system stability in a world where the sun does not always shine, and the wind does not blow consistently? The answer is increasingly found in battery energy storage systems (BESS), which are becoming a central pillar of the energy transition. These systems not only enable more efficient use of energy generated by solar and wind power plants but also provide grid flexibility, enhance security of supply, and reduce dependence on fossil fuels. Without the strong development of battery storage, further growth of renewable energy would be significantly constrained.

Over the past twenty years, since SolarPower Europe began tracking the market, battery energy storage systems in the European Union have been setting

Over the past twenty years, since SolarPower Europe began tracking the market, battery energy storage systems in the European Union have been setting continuous records

Photograph: AI-generated

continuous records. In 2025, the EU installed 27.1 GWh of new capacity. Germany and Italy maintained their leading positions, while Bulgaria emerged as the fastest-growing market. The Netherlands and Spain ranked fourth and fifth, respectively. The threshold for entering the top tier has risen significantly—reaching one gigawatt-hour is no longer sufficient; instead, the connection of substantial volumes of grid-scale batteries is required, according to the latest report published by SolarPower Europe, EU Battery Storage Market Review 2025.

In March 2025, the European Commission adopted a list of 47 strategic projects to strengthen European raw material value chains and diversify supply sources, in line with the Critical Raw Materials Act (CRMA). The targets set for 2030 stipulate that European extraction, processing, and recycling of strategic raw materials should meet 10 percent, 40 percent, and 25 percent of EU demand, respectively. Of the total number of projects, 70 percent are focused on battery-related raw materials.

The European Union remains heavily dependent on global markets for the supply of metals required for battery cell production. According to European Commission data, in 2023, the EU imported nearly 80 percent of its primary battery raw materials and more than 60 percent of processed materials. When it comes to refined lithium—the key chemical component of all batteries—this dependence is complete.

By the end of 2025, Europe had a total annual battery cell manufacturing capacity of 252 GWh, of which 80 percent was dedicated to electric vehicles. From just 1 GWh in 2017, battery cell production in Europe has grown to over 250 GWh today, supported by approximately €33 billion in investments in battery factories. However, many manufacturers are postponing or cancelling expansion plans due to uncertainty around future profitability. Production costs in Europe remain approximately 50 percent higher than in China, and the supply chain ecosystem remains relatively weak.

Most manufacturers continue to import battery cells from Asia and perform only final assembly in Europe, although some use domestically produced cells or rely on strategic partnerships. Only 16 percent of European manufacturers specialize in BESS, whereas some startups are extending the lifecycle of electric vehicle batteries through second-life applications.

As noted in the report, Germany has the largest number of battery system manufacturers in Europe, with 43 active companies, followed by Poland and Hungary. In contrast, the remaining manufacturers are spread across an additional 20 countries. From an estimated 10 active companies in 2010, battery system production in Europe has increased eightfold over the past 16 years.

Forecasts indicate that 2026 will bring further accelerated growth, as existing development plans include nearly 13 GW of new capacity—approximately 50 percent more than the additions recorded in 2025. Growth is also expected to expand into emerging markets in Eastern and Southern Europe, as these regions develop supportive regulatory frameworks and increasingly benefit from favorable market conditions. Bulgaria, Romania, Greece, and Hungary stand out as emerging markets in Southeast Europe, with strong growth anticipated in the coming period.

Illustration: AI-generated

Prepared by Katarina Vuinac

ECOHIVE: A SERBIAN INNOVATION THAT HAS AUTOMATED BEE PROTECTION

When family tradition, curiosity, and technological creativity come together to create a solution capable of transforming an entire sector, stories like that of EcoHive emerge. Although a young company, EcoHive has already attracted the attention of both experts and the beekeeping community by introducing to the market a device that automatically applies an organic treatment against Varroa—the most destructive parasite in modern beekeeping. What once required significant time, effort, and risk has now become an automated, precise, and gentle process that protects bees without disrupting their natural rhythm.

Director Nikola Teomirović explains that EcoHive was not created by chance—it is a natural continuation of a family tradition spanning more than half a century. After a short break, he took over the care of the bees in 2017 and soon faced a persistent adversary: varroa, a mite representing the greatest threat to bee colonies.

Through practical experience, he realized that existing treatments were impractical, insufficiently effective, and often harmful to bees—especially to the queen. At the same time, among numerous chemical solutions, formic acid stood out as an organic compound with great potential but largely untapped.

While still a student at the Nikola Tesla Technical School in Belgrade, Nikola began developing electronic systems that could automate the entire process and thereby increase treatment efficiency. When the prototype began delivering outstanding results, a domestic private investor recognized the project, and EcoHive was born.

A Device That Reduces Nine Apiary Visits to Just One

Traditional varroa treatment required beekeepers to visit their apiaries up to 9 times to protect their colonies. The EcoHive device completely

Photographs: EcoHive

changes this process: a single visit is sufficient, and automation handles the rest. Thanks to smart sensors that continuously monitor hive conditions, the device precisely determines the optimal timing and dosage of formic acid application. The result is a treatment achieving 99.4 percent effectiveness—far above the usual 70 percent—while virtually eliminating harm to the bees.

Most importantly, queen loss—previously reaching up to one quarter of treated colonies with traditional methods—has been reduced to a negligible level. The entire process is carried out gently, in a controlled manner, and in a fully organic manner. An additional advantage is that the device is compatible with all types of hives and operates via its own solar panel, making it independent of infrastructure. It functions optimally even in remote natural apiaries, from mountainous areas to isolated meadows.

Time and Fuel Savings, Reduced Environmental Impact

From a broader perspective, EcoHive delivers not only technical innovation but also significant environmental benefits. Reducing visits from nine to one means drastically lower fuel consumption, fewer carbon dioxide emissions, and less disturbance to bees and the surrounding ecosystem. At the same time, waste is reduced, along with dependence on chemical treatments that have long been standard in combating varroa.

EcoHive was not created by chance—it is a natural continuation of a family tradition spanning more than half a century

It is particularly important that the device uses formic acid, a substance naturally present in honey and wax, against which the parasite cannot develop resistance. While last winter, many commercial preparations contributed to large-scale bee losses, with average colony mortality exceeding 50 percent, apiaries using EcoHive reported losses of only 1.67 percent. This demonstrates that sustainability is not merely an added value, but a core advantage of this technology.

Awards and Support

Developing a device of such complexity in the early stages of business would have been nearly impossible without support from European and domestic funding programs. EcoHive has so far secured more than €200,000 in grants, enabling thorough testing and a secure market launch.

The company has since received numerous recognitions, including the title of ESG Leader among startups for 2024, the WIPO Gold Medal for Innovation, and first place at the POPRI competition for the best business model. All of this indicates that EcoHive's solution is not merely a local success story, but a technology with serious international potential.

Nikola adds that Serbia is gradually developing a healthier ecosystem for high-risk technology projects, as an increasing number of domestic accelerators are supporting young innovators.

Looking Ahead — Ready for the Next Global Challenge

While most beekeepers are still focused on varroa, EcoHive is already looking ahead. Tropilaelaps mites—an even more dangerous parasite for which there is currently no effective solution other than direct sunlight and formic acid—are emerging as the next major threat. Here, the company sees both opportunity and responsibility.

As Nikola explains, EcoHive already holds a patented solution and is waiting for the right moment to initiate new investment cycles and broader commercialization. He is convinced that, in the coming years, this technology will play a key role in advancing more sustainable, resilient beekeeping across Europe.

Automation of organic bee treatment, time and resource savings, protection of the queen and the entire colony, and an environmentally responsible approach without chemical residues—all of this positions EcoHive as one of the most promising Serbian agri-tech innovations.

Prepared by Milena Maglovski

KRALJEVAC: A RESERVE THAT SHOWS THE FUTURE LIES IN COOPERATION

The Special Nature Reserve "Kraljevac" in southern Banat stands out as an oasis sustained by the dedication of people who see in its preservation far more than projects and administrative obligations—they see long-term responsibility and a mission. One of the key actors in that mission is the **Institute for Regional Development (IRIS)**, an organization that has been actively connecting local communities, environmental organizations, scientists, and institutions since 2018.

We spoke with Milica Živković, who has worked for years on projects and programs focused on habitat revitalization and biodiversity protection, about IRIS's role, the results achieved so far, and the challenges of preserving the sensitive Kraljevac ecosystem. Her words clearly demonstrate that Kraljevac is more than a reserve—it is an example of how collective will can transform the future of endangered species and ecosystems.

Photograph: Geza Farkaš

An Institute That Protects Nature in the Field, Not Just on Paper

According to Milica, IRIS was founded with a very clear idea: nature conservation must be practical, visible, and based on cooperation. From the very beginning, the focus has been on fieldwork—projects that bring tangible change to habitats themselves, not just to reports.

— Since our establishment, we have cooperated with the Deliblatsko Jezero Sports Fishing Association, the manager of the Special Nature Reserve Kraljevac. Our collaboration is reflected in numerous concrete field activities. So far, we have implemented more than 30 projects together, primarily aimed at biodiversity conservation through active protection measures, habitat revitalization using nature-based solutions (NbS), stakeholder engagement, education, and raising awareness of the importance of protecting this area, Milica explains.

This reserve, known for its rare wet meadows and rich diversity of birds, amphibians, and distinctive rodent species, increasingly depends on active conservation measures—and this is precisely where IRIS brings added value.

Revitalization of the European Mudminnow Habitat

Among the most significant projects implemented by IRIS, in cooperation with the USR "Deliblatsko Jezero", is the revitalization of the habitat of the European mudminnow (Umbra krameri)—a strictly protected fish species that survives in Serbia at only a few locations.

Within the project "Revitalization of the Umbra Habitat in the Special Nature Reserve Kraljevac," funded by Sweden through the EU Green Agenda program, long-overdue measures were implemented: the removal of 5,000 m³ of sediment from the Činkina Ćuprija canal, the clearing of overgrown vegetation, and the restoration of clean water sources.

— This canal is extremely important as it represents one of the few remaining habitats of the strictly protected European mudminnow (Umbra krameri), also known locally as umbra or mrguda. In the coming period, additional reinforcement of the canal banks is planned through the planting of native tree species, further improving the survival conditions for this endangered species, Milica explains.

The European mudminnow is an indicator of clean and stable aquatic habitats—its survival has therefore become a symbol of the broader effort to preserve Kraljevac.

Microplastics as a Hidden Threat and the First Step Toward Understanding It

IRIS participated in research on the presence of microplastics in the lake water of the Special Nature Reserve "Kraljevac" through the project "SRP Kraljevac – A Good Practice Example in Mitigating Negative Impacts on Freshwater Ecosystems in Vojvodina," implemented within the SAFE program under the auspices of WWF Adria. This was also the first assessment of microplastics in the waters of Lake Kraljevac, carried out in cooperation with Maja Raković, PhD, and Jelena Stanković, PhD, from the Institute for Biological Research "Siniša Stanković."

Photograph: Pavle Jovanović, UNDP

Preliminary results showed that fibers were the most prevalent category of microplastic particles, while fragments accounted for a significantly smaller share. The analyses indicate that microplastics in the lake primarily originate from single-use plastics and inadequate waste management in the immediate

surroundings, reflecting broader trends of excessive packaging consumption and low recycling rates.

— These results are important because they provide us with a clearer picture of the pressures affecting the lake ecosystem and highlight the need for concrete protection measures, as well as education of the local community on reducing plastic waste. Although these are only preliminary findings, we plan to continue the research to monitor trends in microplastic presence and further improve conservation strategies for this sensitive ecosystem. The results have already been published in a scientific paper, which further confirms the significance and quality of the research conducted, she emphasizes.

Without the Local Community, There Is No Long-Term Protection

One of Kraljevac's greatest strengths lies in the fact that the local community perceives it as part of its own identity. Together with the reserve's managing authority, IRIS established the first User Council within protected areas in Serbia—a body that brings together all relevant stakeholders: local organizations, shepherds, fishermen, institutions, and farmers.

Through the User Council, cooperation with stakeholders within the reserve has been further strengthened.

A notable example of integrating traditional practices is the project "Green Pastures for a Green Transition." The revitalization of the Spasovina pasture was implemented by the Institute for Regional Development in partnership with USR "Deliblatsko jezero," with financial support from the Government of Switzerland through the initiative "EU for the Green Agenda in Serbia."

— Habitat revitalization included the application of nature-based solutions (NbS), active involvement of a local shepherd, and the reintroduction of traditional grazing practices on the pasture. In this way, not only are the grasslands preserved, but the strictly protected European ground squirrel is safeguarded, and the sustainability of the ecosystem is ensured, Milica explains.

She adds that nature conservation is a complex process, and that the greatest challenge is not a lack of willingness, but rather aligning different stakeholders and establishing stable, long-term cooperation.

In this context, IRIS serves as a bridge—connecting scientists and reserve managers, donors and local associations, institutions and citizens.

— In the field, we work together with the reserve management, local associations and informal groups, local residents, representatives of local self-government units, the Provincial Institute for Nature Protection, and researchers. We carry out joint activities, share knowledge and experience, and provide support in planning and implementing active conservation measures. In this way, projects become sustainable, coordinated, and clearly beneficial for both the community and nature, our interlocutor emphasizes.

Future Plans – Kraljevac as a Model of Good Practice

IRIS's plans for the coming years go far beyond current activities. They include continuous monitoring of key species, habitat revitalization using nature-based solutions (NbS), and projects that strengthen community awareness and actively engage citizens in conservation efforts. Further cooperation with the scientific community is also planned, including research to improve understanding of ecosystem conditions and to adjust protection measures based on scientific data. This approach will help ensure that Kraljevac remains a model of good practice in the conservation of wetland and grassland habitats in the region.

The story of Kraljevac is not merely about preserving a single location. It is a story of how people, when working together with a clear purpose, can restore ecosystems, protect rare species, and build more resilient communities.

Thanks to organizations such as IRIS, the reserve management authority, scientists, and local residents, Kraljevac today is not just a protected area—it is a symbol of hope and a model that can inspire similar areas across Serbia.

Prepared by Milena Maglovski

Photograph: Pavle Jovanović, UNDP

DRIVING THE ENERGY TRANSITION

KEY – The Energy Transition Expo is the most important European event dedicated to technologies, services, integrated solutions for energy efficiency and renewable energies in Italy and the Mediterranean basin, the place to highlight the acceleration of energy and climate policies and the opportunities opening up in the market.

KEY

THE ENERGY TRANSITION EXPO

4 → 6 MARCH 2026

RIMINI EXPO CENTRE ITALY

GET YOUR FREE TICKET

key-expo.com
#climatefriends

Organized by
ITALIAN EXHIBITION GROUP
Providing the future

In collaboration with
Opportunitaly
ITA

Simultaneously with
DPE
ITALIA SOLARE
Forum Tech

More energy, efficiency, Europe.

Lower costs.

Powerful. Efficient. Safe. The Fronius Argeno unlocks the full potential of your commercial PV systems. With 125 kW of power, a peak efficiency of 99.1%, and ten high-performance MPP trackers, it ensures high yields and maximum design flexibility. The integrated and replaceable surge protection devices reduce installation costs and simplify servicing. Manufactured in Europe – for the highest quality standards and long-term stable system performance.

Fronius **Argeno**.
Gets the maximum out of your commercial PV system.

More information at www.fronius.com/argeno-en

Fronius