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**ELNOS**  
GROUP

Decembar December 2022  
Besplatan primjerak Free copy

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LOOKING ABOVE THE HORIZON

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NAJVEĆI ZADATAK  
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THE GREATEST TASK FOR  
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**ODRŽIVA  
BUDUĆNOST**

A SUSTAINABLE FUTURE

HVDC DolWin 5, Njemačka  
Treći HVDC izazov za Elnos Grupu  
HVDC DolWin 5, Germany  
The third HVDC challenge for Elnos Group



# Riječ urednika

## Editors letter

 Dragi prijatelji, poštovani partneri,

U vrijeme kada se svijet suočava s ozbiljnom klimatskom i energetskom krizom, Elnos Grupa pojačava korak u pravcu izgradnje održive budućnosti. Kroz nevjerovatan inženjering, angažovani smo na brojnim projektima obnovljivih izvora energije (OIE). Najznačajniji među njima odnose se na izgradnju novih elektrana, ali su podjednako važni i projekti izgradnje najmodernije infrastrukture za integraciju zelene energije u elektroenergetski sistem.

Naša vizija je da budemo dio globalne energetske slike u decenijama koje dolaze. Ali naša ambicija tu svakako ne prestaje: radimo i na velikom broju najkompleksnijih energetskih projekata koji imaju za cilj jačanje, sigurnost i stabilnost elektroenergetskog sistema. U srcu Elnosovog djelovanja su i ostali UN ciljevi održivog poslovanja, za neke od njih smo i nagrađeni, a te priče sa radošću dijelimo sa vama.

Sa nikada snažnijim fokusom na održivost, radimo na svjetlijoj budućnosti za sve. Uvjereni smo da uz pomoć naših partnera možemo napraviti stvarnu razliku i zajedno stvoriti nova radna mjesta, održivo energetsko okruženje i ekonomski rast.

U ovom časopisu su najbolji momenti i inženjerski poduhvati iz naše poslovne godine.

 Dear friends and partners,

The world is facing a pressing climate and energy crisis. At the same time, Elnos Group is stepping up the pace toward building a sustainable future. Through our impressive engineering, we advance in numerous renewable energy sources projects (RES). The most important among them imply the construction of new power plants. However, projects to build state-of-the-art infrastructure for the integration of green energy into the power systems do not lag behind in their importance.

Our vision is to be a part of the global energy picture in the decades to come. Yet, our ambition does not stop here: we are working on many highly complex energy projects aiming to provide additional strength, safety and stability of electrical power systems. The UN's sustainable development goals are at the core of our activities and we are happy to share with you the stories of rewards we have been given in recognition of our achievements in this aspect.

More strongly focused on sustainability than ever, we strive to provide a brighter future for all. We remain convinced that, with the support of our partners, we can make a difference and create new job opportunities, a sustainable power environment and economic growth.

In this magazine, we share with you our most memorable moments and most remarkable engineering breakthroughs of the year.

**Mirjana Štrbac**  
**Direktor korporativnih komunikacija**  
Director of Corporate Communications



MIRJANA ŠTRBAC, Elnos Grupa  
Glavni i odgovorni urednik [Editor in Chief](#)



ĐORĐE ŽIVANOVIĆ, Elnos Grupa  
Grafički urednik i dizajner [Art director and designer](#)



ZORICA DRAGOVIĆ, Elnos Grupa  
Novinarka [Journalist](#)

Saradnici na tekstovima / Text collaborators:  
Slobodan Plavljanin, Marko Mijić, Zoran Kukobat, Aleksandar Šukalo, Jure Jagrić, Kristijan Aïnovski, Martin Spasovski, Srećka Žlajpah, Stefan Golubović, Petar Todorović, Marek Sušora, Nenad Vukomanović, Dragan Jurošević, Milenko Jačanin, Radovan Spasojević, Goran Đurasović, Mladen Milićić, Bojan Gale, Dejan Indić, Borisav Novaković, Branko Marković, Đorđe Jonlija, Slobodan Mićić, Biljana Čolić, Vlatka Dodik, Nebojša Milosavljević, Predrag Ivanović, Saša Varnica, Franci Mihar, Mitar Vadić i Radenko Škoro.

Fotografije / Photos: Elnos Grupa  
Novinari saradnici / Journalists Collaborators: Jelena Batinić  
Dizajn i prelom / Design and layout: Đorđe Živanović, Sanja Polovina  
Prevod na engleski / Translation to English: Snježana Terzić  
Lektor: Saša Ćetojević

Štampa / Print: Grafomark, Laktaš  
Tiraž / Circulation: 2.500 kom./pcs  
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VJETROPARK KRIVAČA  
242 HEKTARA NOVIH  
MOGUĆNOSTI

WIND PARK KRIVAČA  
242 ACRES OF NEW  
POSSIBILITIES

Spretno i punom parom nastavili smo graditi vjetropark Krivača (103 MW), prvi vjetropark Srbije koji nastaje južno od Save i Dunava.

It is with full skill and in full swing that we continue with the construction of wind park Krivača (103 MW), the first wind park in Serbia to be constructed south of the Sava and the Danube.



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INTERVJU  
**ZNANJE JE ODGOVOR NA IZAZOVE  
ENERGETIKE BUDUĆNOSTI**

INTERVIEW  
**KNOWLEDGE IS THE RESPONSE TO  
FUTURE CHALLENGES IN ELECTRICAL  
ENGINEERING**

Zoran Kukobat, direktor Elnos Srbije, podijelio je sa nama svoju priču o „malim-velikim“ mudrostima važnim za profesiju inženjera, ljubavi prema inženjeringu i trendovima savremene energetike.

Zoran Kukobat, Director of Elnos Serbia, shared with us a piece of wisdom on things important in engineering as a practice and his thoughts of love for the profession and trends in modern electrical engineering.



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PRVA DECIJINA ELNOS NORDICA  
**JEDINSTVEN BREND NA  
ŠVEDSKOM TRŽIŠTU**

THE FIRST DECADE OF ELNOS NORDIC  
**A UNIQUE BRAND IN THE  
SWEDISH MARKET**

Sa više od 70 uspješno realizovanih projekata širom Švedske, Elnos Nordic je u godini svog 10. jubileja potvrdio poziciju neprikosnovenog partnera među nordijskim elektroenergetskim kompanijama.

With more than 70 successfully completed projects throughout Sweden, in the year of its 10th anniversary, Elnos Nordic firmly holds the position of an unchallenged partner among Nordic electrical engineering companies.



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## DALEKOVODI BUDUĆNOSTI VELIKA PETORKA

### TRANSMISSION LINES OF THE FUTURE THE GRAND FIVE

Ekipe Elnos Grupe ove godine bile su dio prvog plana najvažnijih projekata rekonstrukcije i izgradnje dalekovoda, koji će značajno doprinijeti stabilnosti mreže regije i Evrope.

This year, Elnos Group teams have been in the focus of the most important transmission line construction and reconstruction projects, which will significantly contribute to the overall stability of the regional and European power transmission network.



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## ŽIVIMO VIZIJE ONI SU SNAGE MODERNE ENERGETIKE

### WE LIVE OUR VISION THEY ARE THE POWER OF MODERN ELECTRICAL ENGINEERING



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## KOLOSIJEK NOVOG DOBA U ZLATNOM POJASU KOPRA

### A RAIL FOR A NEW AGE IN THE GOLDEN STRIP OF KOPER

Izgradnja drugog kolosijeka željezničke pruge Divača–Koper strateški je jedan od najvažnijih infrastrukturnih poduhvata u Sloveniji. Naše ekipe su važna karika ove kompleksne misije.

Construction of the second track of the railway line Divača–Koper is a strategic and one of the most important infrastructure endeavors in Slovenia. Our teams play an important role in this complex mission.



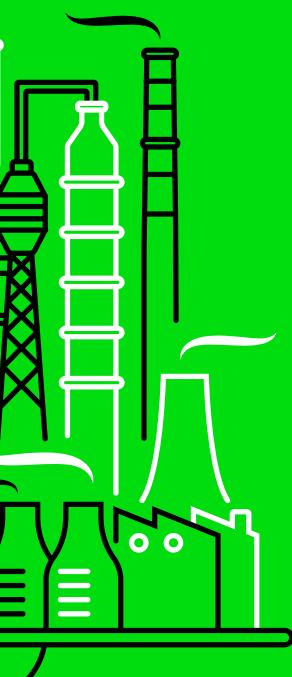
Generacijama koje teže pozitivnim promjenama u svijetu mjesto je u savremenoj energetici. Podržati misiju mladih ljudi spremnih da grade karijere u ovoj oblasti naša je posebna misija.

Generations eager for positive changes in the world belong to modern electrical engineering. It is our vision to support the people ready to build their careers in this field.

# ODRŽIVA BUDUĆNOST

A SUSTAINABLE FUTURE





**SR** Svjetski klimatski izazovi nikada do sada nisu bili veći, a poruka nauke nikada jasnija – kao globalna zajednica moramo brzo i aktivno da djelujemo kako bismo sačuvali budućnost planete.

U svom nedavnom izvještaju UN-ovo Medu-vladino tijelo za klimatske promjene (IPCC) iznijelo je zaključak da bi globalna temperatura i dalje mogla rasti za  $1,5^{\circ}\text{C}$  do 2040. ako države svijeta ne počnu primjenjivati ozbiljnije mјere na sprečavanju globalnog zagrijavanja.

U prilog tome nikako ne ide podatak prema kojem je ove godine čak 60 odsto globalne energije proizvedeno iz fosilnih izvora, dok je istovremeno 80 odsto svjetskih energetskih potreba podmireno naftom, gasom i ugljem. Ovi loši procenti ukazuju na to da je ubrzavanje tranzicije ka održivim energetskim izvorima više nego ikada srž borbe protiv klimatskih promjena.

Prateći zahtjeve energetski održive budućnosti, rad Elnos Grupe je 2022. godine bio snažno usmjeren na povećanje obnovljivih energetskih kapaciteta i stvaranje infrastrukture koja podržava prodor nove zelene energije u elektroenergetske sisteme regije i Europe.

**EN** Global climate challenges have never been bigger, and science has never been clearer in its response – as a global community, we must act instantly and actively so as to preserve the future of the planet.

In its recent report, the UN's Intergovernmental Panel on Climate Change (the IPCC) concluded that global temperature might still rise for  $1,5^{\circ}\text{C}$  by the year 2040 unless the countries in the world start implementing more serious measures to prevent global warming.

This situation is not at all supported by the fact that this year, more than 60 percent of global energy has been produced from fossil fuels, while at the same time, 80 percent of global energy needs have been met by oil, gas and coal. These unfavorable percentages indicate that transition to sustainable energy sources is at the core of the fight against climate change.

Following the sustainable future requirements, the activities of Elnos Group in 2022 have been strongly focused on the increase of renewable energy capacities and the creation of infrastructure that supports the breakthrough of new green energy to the electrical power systems of the region and Europe.



Budući izgled mašinske zgrade HE Dabar The future powerhouse of HPP Dabar

**HE DABAR** HPP DABAR

# POGLLED IZNAD HORIZONTA

LOOKING ABOVE THE HORIZON

**HIDROELEKTRANA DABAR** (159,15 MW) je prvi i najznačajniji korak ka ostvarenju više decenija stare vizije o izgradnji megaprojekta „Gornji horizonti“.

Elnos Grupa ove godine postala je dio ovog velikog zelenog zadatka, u okviru kojeg ćemo realizovati kompletну elektro i mašinsku fazu radova.

**HYDRO POWER PLANT DABAR** (159,15 MW) is the first and the most significant step towards the fulfillment of a several decades old vision - the megaproject "Upper Horizons".

This year, Elnos Group has become a part of this big green mission within which we are to perform the overall electrical and mechanical works.

## **SR „GORNIJ HORIZONTI“**

U jugoistočnom i kraškom dijelu Bosne i Hercegovine, zemlje koju zbog njenog velikog hidropotencijala zovu energetski Eldorado, teče jedna od najvećih evropskih ponornica, rijeka Trebišnjica (96,5 km). Ova rijeka je fenomen u geografskom i hidroenergetskom smislu.

Sa slivom voda iz četiri kraška polja – Gatačkog, Nevesinjskog, Fatničkog i Dabarskog, ona je nosilac energetskog potencijala koji se procjenjuje na 110 miliona kilovat-sati električne energije godišnje.

Ako dođete u regiju sliva Trebišnjice u ljetnom periodu, lako ćete se zapitati: „A gdje je voda o kojoj se priča?“ Naime, ispred vas će se nalaziti nepregledna kraška polja, ali vodu golim okom nećete vidjeti, jer ona teče nevidljivim žilama ispod površine tla.

Inženjerska vizija o pohodu na zelene megavate ovog podneblja datira još iz pedesetih godina prošlog vijeka. Ova vizija nosi naziv „Gornji horizonti“.

Koncepcija izgradnje „Gornjih horizonata“ zasniva se na velikom vodnom potencijalu i kaskadnom rasporedu kraških polja, čiji geografski položaj omogućuje da se voda što duže zadrži na površini i koristi u svom optimumu.

Upravo zato koncept „Gornji horizonti“ podrazumijeva izgradnju čak sedam hidroelektrana i šest akumulacionih bazena u sistemu istočne Hercegovine. Najvažnija karika u ovom sistemu je hidroelektrana Dabar.

## **HE DABAR**

„Inženjeri tokom školovanja maštaju o dostizanju znanja neophodnih za izgradnju objekata poput HE Dabar. Biti dio ovog procesa biće posebno profesionalno ispunjenje i zadovoljstvo“, rekao je Marko Mijić, član Uprave za tehničke poslove Elnos Grupe, uvodeći nas u priču o HE Dabar.

Izgradnja hidroelektrane Dabar je prvi i najznačajniji korak u realizaciji projekta „Gornji horizonti“. Ova hidroelektrana, snage 159,15 MW, biće jedna od najvećih u BiH.

HE Dabar je složen hidroenergetski sistem osmišljen za korištenje hidropotencijala slive rijeke Zalomke i akumulacije u Nevesinjskom polju, sa utvrđenim protokom od 55 m<sup>3</sup>/s, neto padom od 332,20 m i planiranom godišnjom proizvodnjom od 251,80 GWh.

Njena izgradnja je veliki tehnički i logistički izazov. Akumulacioni bazen za HE Dabar će formirati brana Pošćenje, koja će se nalaziti u donjem dijelu Nevesinjskog polja, gdje se ujedno završava i nadzemni tok rijeke Zalomke.

Cinjenica da je nevesinjska akumulacija kilometrima udaljena od buduće mašinske zgrade

HE Dabar zahtijeva izgradnju posebnog sistema dovodenja vode iz ove akumulacije do turbina.

Najveća specifičnost izgradnje HE Dabar je upravo ovaj dovodni sistem, jer će vode iz nevesinjske akumulacije do mašinske zgrade HE Dabar stizati dovodnim tunelom, vodostanom i cjevovodom pod pritiskom.

„Okosnica ovog dovodnog sistema biće jedan od najvećih dovodnih tunela u Evropi, čija dužina će iznositi 12,14 km. Ovaj dovodni tunel počinje ulaznom građevinom iz nevesinjskog sela Biograd, na lokaciji udaljenoj tri kilometra od brane Pošćenje, a završava se na vodostanu u brdu na sjevernoj strani Dabarskog polja. Mašinska zgrada hidroelektrane nalazi se na sjeveroistočnom obodu Dabarskog polja. Ona ima podzemni i nadzemni dio. U mašinskoj zgradi biće smještene tri Pelton turbine i sinhroni generator posljednje generacije, što su pogoni koji će u perspektivi biti jedan od segmenata našeg rada na ovom projektu“, rekao je Miodrag Čitaković, savjetnik tehničkog direktora u Elnosu Srbija.

Preradene vode iz HE Dabar dalje teku kanalom trapezastog oblika, dugim 6.750 metara, kroz Dabarsko polje u tunel Dabar-Fatnica ka akumulaciji Bilećkog jezera.

## **ELNOS GRUPA NA ZADATKU HE DABAR**

Hidroelektrana Dabar je prva velika greenfield investicija u oblasti elektrana u BiH u posljednje tri decenije. Biti dio ovako kompleksnog projekta izazov je kakav Elnos Grupa na domaćem tržištu dugo pričeljkuje.

Kao partner sa kompanijom Voith Hydro, vodećim svjetskim proizvođačem generatora i turbina velikih snaga, učestvujemo u ugovoru sa kompanijom China Gezhouba Group Corporation (CGGC), koja je glavni izvođač projekta izgradnje HE Dabar. Elnos Grupa i Voith Hydro su evropska komponenta ovog projekta, a imamo dugogodišnju uspješnu saradnju u oblasti hidroenergije, čiji su najbolji primjer zajednički rezultati koje smo napravili kroz projekte revitalizacije HE Zvornik (124 MW) i revitalizacije HE Piva (342 MW).

Elnos Grupi u okviru izgradnje HE Dabar povjerena je realizacija sveobuhvatnih etapa radova koji se odnose na projektovanje, isporuku, montažu i puštanje u rad kompletne elektromašinske opreme u mašinskoj zgradi hidroelektrane te elektroopreme na nivou cijele elektrane.

Iste etape radova povjerene su nam na planu instalacije 220 kV rasklopog postrojenja zajedno sa 220 kV kablovskom vezom između

njega i energetskih blok-transformatora, te izgradnje 2x220 kV dalekovoda za ostvarivanje veze sa prenosom mrežom Bosne i Hercegovine.

## **PROJEKTOVANJE, ISPORUKA, MONTAŽA I PUŠTANJE U RAD KOMPLETNE ELEKTROMAŠINSKE OPREME U OKVIRU MAŠINSKE ZGRADE:**

- Turbina sa pomoćnim sistemima
- Generator sa pobudnim i ostalim pomoćnim sistemima
- Oprema generatorskog napona
- Energetski blok-transformatori

## **PROJEKTOVANJE, ISPORUKA, MONTAŽA I PUŠTANJE U RAD ELEKTROOPREME NA NIVOU CIJELE ELEKTRANE:**

- Opšte električne instalacije svih objekata
- Sistem sopstvene potrošnje
- Sistemi slabe struje
- Telekomunikacioni sistemi i računarske mreže
- Sistem upravljanja, zaštite i mjeranja

## **BUDUĆI KORACI**

Radovi na izgradnji dovodnog tunela za HE Dabar traju od septembra 2016. U godini pred nama fokus radnih aktivnosti premješta se na planiranje, pripremu i izgradnju objekata HE Dabar: brane Pošćenje, ulazne građevine, vodostana, cjevovoda pod pritiskom, zgrade sa pratećim objektima, zaštitnih nasipa Grebak i Vranjača te stalnih pristupnih puteva.

Izgradnja ove hidroelektrane pred sve kompanije učesnice u projektu stavlja zahtjev visokog nivoa komunikacije, organizacije i

posvećenosti detaljima prilikom realizacije svih faza projekta.

„Elnos Grupa je kompanija sa višegodišnjim iskustvom na polju elektroenergetike i obnovljivih izvora energije i sa posebnom motivacijom gledamo upravo na realizaciju velikih domaćih i regionalnih zelenih energetskih poduhvata. Uvjereni smo da ćemo kroz ovaj zahtjevan projekt uspješno pokazati performanse našeg inženjeringu“, rekao je Mijić.



## MARKO MIJIĆ

Član Uprave za tehničke poslove Elnos Grupe  
Elnos Group Board Member for Technical Affairs

**SR** „Jedno je sigurno, ovaj projekat je za Elnos Grupu među najvećima po obimu isporuke opreme, realizacije radova kao i složenosti tehničkog rješenja i implementacije. Njegovom realizacijom ćemo stići značajno novo iskustvo u izgradnji velikih hidroenergetskih objekata i realizaciji kompleksnih projekata, što će dodatno osnažiti naš stručni kadar, koji već posjeduje multidisciplinarno iskustvo.“

**EN** “One thing is sure. This project is one of the largest projects for Elnos Group, in terms of the scope of equipment to be delivered, works to be performed and the overall level of complexity of technical solutions and general implementation. To successfully complete a project such as this one, means to gain significant new knowledge in the construction of large-scale hydropower facilities and implementation of highly complex projects, which will, in turn, additionally strengthen our already multidisciplinary professionals”.

## EN “UPPER HORIZONS”

The southeastern karst region of Bosnia and Herzegovina, a country known as El Dorado of electrical power for its massive hydro potential, is the home of Trebišnjica, one of the longest subterranean rivers in Europe (96,5 km). This river is a true phenomenon in terms of both, geography and hydropower.

With a catchment area encompassing four karst fields – those of Gacko, Nevesinje, Fatnica and Dabar, this river is the backbone of the country's power potential estimated to reach 110 million kilowatt-hours per year.

If you come to this region during the summer season, you will be prone to ask: „And where is all the water everybody is talking about?“. You are most likely to see nothing but endless karst fields, with not a single drop of water rolling down the surface. This is because billions of such drops are hidden below the surface, forming a bloodstream invisible to the human eye.

To harvest all these green megawatts is an engineering vision dating back to the 1950s. The vision has a name – “Upper Horizons”.

The concept of this megaproject is based on enormous hydro potential and cascade position and arrangement of the karst fields, the geographical position of which allows for a prolonged flow of water above the surface and its optimum use.

It is precisely for these reasons that the “Upper Horizons” concept implies the construction of as many as seven hydro power plants and six accumulation reservoirs in East Herzegovina. The most important element in the overall system is hydro power plant Dabar.

## HYDRO POWER PLANT DABAR

“Throughout their education, engineers dream of acquiring the knowledge necessary to construct a facility such as HPP Dabar. Being a part of this process thus represents the most specific professional fulfillment and pleasure”, said Marko Mijić, Elnos Group Board Member for Technical Affairs, when introducing us to the story of HPP Dabar.

Construction of hydro power plant Dabar is the first and the most important step in the realization of the project “Upper Horizons”. This hydro power plant, with a capacity of 159,15 MW, will be one of the biggest plants in B&H.

HPP Dabar is a complex hydro power system designed to the use hydro potential of river Zalomka and accumulation in the Dabar karst field. The flow amounts to 55 m<sup>3</sup>/s, the net head is 332,20 m and annual production is estimated at 251,80 GWh.

Construction of this facility is a huge technical and logistical challenge. Dam Pošćenje will be constructed to form the accumulation for the HPP Dabar, located in the lower part of Nevesinje karst field where the over ground flow of river Zalomka ends.

This accumulation near Nevesinje will be kilometers away from the future powerhouse of HPP Dabar. As a consequence, it is necessary to construct a whole new system to take the water from the accumulation to the turbines.

This particular water intake system is the most specific element of HPP Dabar. The water from the Nevesinje accumulation will reach the HPP Dabar through an intake tunnel, surge tank and pressure pipeline.

“The backbone of this water intake system will be one of the longest water intake tunnels in the whole of Europe. This 12,14 km long tunnel starts with an intake structure in the village Biograd near Nevesinje, 3 km away from Pošćenje dam, and ends with a surge tank on a hill on the north side of Dabar field. The powerhouse is located along the northeastern perimeter of Dabar field. One part of the powerhouse is underground while the other is above the ground level. This powerhouse will contain three Pelton turbines and a state-of-the-art synchronous generator. These machines will, in future perspective, become a part of what we are to do on this project”, said Mijodrag Čitaković, Advisor to the Director of Operations at Elnos Serbia.

Potpisivanje ugovora sa kompanijom Voith Hydro Austria u Trebinju  
Signing of the contract with Voith Hydro Austria company in Trebinje



The treated water is taken from the HPP Dabar by a 6.750 m long trapezoidal canal running through the Dabar field to the Dabar-Fatnica tunnel, all the way to Bileća lake accumulation.

## ELNOS GROUP ON HPP DABAR MISSION

Hydro power plant Dabar is the first big greenfield investment in B&H power plants in the last three decades. Being a part of such a complex project is a local challenge Elnos Group has been longing for.

As a partner of Voith Hydro, a leader in the production of large-scale generators and turbines, we are participating in a contract with China Gezhouba Group Corporation (CGGC), the main contractor on HPP Dabar. Elnos Group and Voith Hydro are European components of the project. The companies have long and successful cooperation in the domain of hydropower, the finest examples of which are the results of their joint efforts invested in the revitalizations of HPP Zvornik (124 MW) and HPP Piva (342 MW).

Within the construction of HPP Dabar, Elnos Group has been entrusted with the realization of whole stages of works to complete design, delivery, installation and commissioning of overall electromechanical equipment in the powerhouse, and electrical equipment in the entire hydro power plant.

The same phases of the works have been assigned to us also in respect of the installation of a 220 kV switchyard, along with 220 kV cable

### DESIGN, DELIVERY, INSTALLATION AND COMMISSIONING OF OVERALL ELECTROMECHANICAL EQUIPMENT WITHIN THE POWERHOUSE:

- Turbine with auxiliary systems
- Generator with excitation and other auxiliary systems
- Generator voltage equipment
- Power transformers

### DESIGN, DELIVERY, INSTALLATION AND COMMISSIONING OF ALL ELECTRICAL EQUIPMENT IN THE ENTIRE POWER PLANT:

- General electrical installations on all facilities
- Own consumption system
- Weak current system
- Telecommunication systems and computer networks
- Control, protection and measurement system

connections between the switchyard and power transformers, as well as building a 2x220 kV transmission line for connection with the power transmission network of Bosnia and Herzegovina.

## FUTURE STEPS

Works on the construction of the intake tunnel for HPP Dabar started in September 2016. In the year ahead of us, the focus of our activities will switch to planning, preparation and construction of HPP Dabar: Pošćenje dam, intake structure, surge tank, pressure pipeline, the building with auxiliary structures, protective embankments Grebak and Vranjača and permanent access roads.

Construction of this hydro power plant puts an enormous challenge before all the parties involved in the project, in terms of communication, organization and dedication to detail during all project phases.

"Elnos Group is a company with an extensive experience in electrical engineering and renewable energy sources and we are highly motivated to be involved precisely in large green energy projects on both, local and regional levels. We rest assured that by participating in this highly demanding endeavor we will demonstrate our engineering performance with great success", said Mijić.

Najveći dovodni tunel u Evropi (12,14 km) The largest intake tunnel in Europe (12,14 km)



# 242 HEKTARA NOVIH MOGUĆNOSTI

242 ACRES OF NEW POSSIBILITIES

**U VELIKOJ TRANZICIJSKOJ TRCI** zamjene fosilne zelenom energijom vjetroparkovi u Srbiji igraju najznačajniju ulogu. Danas više od 62 odsto zelene energije Srbije dolazi iz vjetra ili, da preciziramo, iz snažnih vjetrova koji duvaju ravnicama sjeverno od Save i Dunava. Vjetropark Krivača (103 MW) je prvi vjetropak u Srbiji koji nastaje južno od ove riječne granice.

**IN THE HEAT OF TRANSITION** from fossil to green energy, wind parks play the most important role in Serbia. Today, more than 62 percent of Serbian green energy comes from wind power or, to be more precise, from strong winds blowing in the plains north of the Sava and the Danube. Wind park Krivača (103 MW) is the first wind park in Serbia being constructed south of this river border.



**SR** Na samo šest kilometara udaljenosti od Đerdapske klisure i rumunske granice nalazi se teren na kojem se gradi vjetropark Krivača. Godinama unazad ova lokacija bila je gotovo zaboravljena pustopoljina istočne Srbije. Danas na njoj vlada zahuktala radna atmosfera iz koje se radaju prvi obrisi novog velikog poduhvata.

Vjetropark Krivača nastaje na 242,16 hektara zemljišta. Područje na kojem će se prostirati zahvata oblasti tri opštine ovog kraja – Golubac, Kučevi i Veliko Gradište. U okviru vjetroparka biće izgrađene 22 vjetroturbine snage po 4,7 MW i maksimalne visine 180 metara.

### ELNOS SRBIJA NA ZADATKU

Ekipama Elnos Srbije povjerena je izgradnja elektroenergetskih objekata zahvaljujući kojima će vjetropark Krivača biti priključen na 110 kV elektroenergetsku mrežu.

Naime, energija iz vjetroparka Krivača ispo-

ručivaće se preko trafostanice 33/110 kV VE Krivača, koja će biti povezana na 110/35 kV trafostanice Veliko Gradište i Neresnica posredstvom dva nova 110 kV dalekovoda.

Naša kompanija angažovana je kao glavni ugovarač koji gradi Balance of Plant – BoP, odnosno putnu infrastrukturu u prvoj fazi projekta, i Connection Works – CW, odnosno priključke ovog vjetroparka na prenosnu mrežu u prvoj i drugoj fazi projekta.

To podrazumijeva izgradnju 13 kilometara internih puteva, objekta transformacije 33/110 kV VE Krivača, 110 kV priključno-razvodnog postrojenja (PRP), proširenje dvije postojeće 110/35 kV trafostanice Veliko Gradište i Neresnica, izgradnju 110 kV dalekovoda, kao i polaganje 10 kV kabla za napajanje postrojenja sopstvene potrošnje priključno-razvodnog postrojenja (PRP) 110 kV Krivača. Ekipe Elnos Srbije biće uključene u sve etape izgradnje ovih objekata.

**LJETO 2022.**

Vjetropark Krivača gradi se na brdsko-planinskom terenu, na lokaciji na kojoj zime znaju biti hladne i neugodne. Upravo je zato dinamika radova za vrijeme ovog ljeta imala snažan tempo.

„Tokom ljetnih mjeseci naše ekipe privele su kraju građevinske radove na izgradnji objekta transformacije 33/110 kV VE Krivača i kompletirale izgradnju novih dalekovodnih polja u priključnim trafostanicama Veliko Gradište i Neresnica. Nakon toga ušli smo u etape izgradnje priključno-razvodnog postrojenja u VE Krivača, zatim opremanja objekta transformacije VE Krivača elektroenergetskom opremom te izgradnje 110 kV dalekovoda PRP Krivača-TS Veliko Gradište i dalekovoda PRP Krivača-TS Neresnica, ukupne dužine 40 kilometara, kojim će se novi vjetropark povezati na postojeću elektroprenosnu mrežu“, rekao je Stefan Golubović, rukovodilac divizije za elektrane Elnos Srbije.

Važno je istaći i to da je timovima Elnosa povjerenia izrada kompletne projektne dokumentacije za izvođenje svih elektroenergetskih objekata i dobijanje svih dozvola za stavljanje objekata u upotrebu.

### **VRHUNAC RADOVA TEK SLIJEDI**

Izgradnja vjetroparka Krivača za timove Elnos Srbije važna je prilika za potvrdu najviših standarda inženjeringu u oblasti obnovljivih izvora energije. Ovo je dinamičan poduhvat koji će uposliti širok spektar resursa Elnos Grupe.

Na vrhuncu radova, koji se očekuje na proljeće i ljeto naredne godine, na terenu će biti angažvana skoro kompletna operativa Elnos Srbije.

Radovi na izgradnji vjetroparka Krivača trebalo bi da budu okončani u drugoj polovini 2023. godine, kada će prema planu vjetrolektrana da počne proizvodnju i isporuku električne energije u prenosnu mrežu Srbije.

**U SLUŽBI ZAJEDNICE**

Vjetropark Krivača gradi se u kraju koji mnogi smatraju najmističnijim i najljepšim dijelom istočne Srbije. Ovo je nedovoljno razvijena regija sa velikim potencijalom. Izgradnja vjetroparka u konačnici će višestruko poboljšati stanje mreže lokalnih puteva. Novoizgrađene dionice puta otvorice nove turističke mogućnosti za obilazak prirode u krajevinama iz kojih se pružaju fenomenalni pogledi ka čitavom Braničevskom okrugu, kao i na Dunav, koji je u ovom dijelu najširi na cijelom svom toku. Pored toga, izgradnja dva dalekovoda će ojačati elektroprenosni sistem u ovom dijelu Srbije i povećati kvalitet i sigurnost snabdijevanja potrošača.

Gradilište vjetroparka Krivača (103 MW) Wind park Krivača (103 MW) construction site





Vrhunac radova slijedi na proljeće Works are expected to culminate in spring

**EN** Wind park Krivača is being constructed on a location only 6 kilometers away from Đerdap Gorge and Romanian border. For years back, this location had been an almost forgotten wasteland in East Serbia. Today, in a warmed-up working atmosphere, this huge new endeavor is forming its first shapes.

Wind park Krivača occupies 242,16 acres of land. Once completed, it will spread on areas of three municipalities in this part of the country – Golubac, Kučovo and Veliko Gradište. The wind park will include a total number of 22 wind turbines, 4,7 MW each, with maximum height of 180 meters.

### ELNOS SERBIA ON A MISSION

Elnos Serbia teams are entrusted with construction of electrical power facilities through which wind park Krivača will get connected to 110 kV electrical power network.

Namely, the power produced in wind park Krivača will be delivered through a 33/110 kV substation WP Krivača, connected to 110/35 kV substations Veliko Gradište and Neresnica with two new 110 kV transmission lines.

Our company is the Main Contractor for Balance of Plant – BoP, that is road infrastructure in the first phase of the project, and Connection Works – CW, i.e. connection of this wind park to

the power distribution network in the second phase of the project.

These imply construction of 13 kilometers of roads, 33/110 kV transformer facility WP Krivača, 110 kV distribution facility, expansion of two existing 110/35 kV substations Veliko Gradište and Neresnica, construction of 110 kV transmission line as well as laying 10 kV cable to provide power supply for own consumption of 110 kV connection-distribution plant Krivača.

Elnos teams will be actively involved in all phases of construction of these facilities.

### SUMMER 2022

Wind park Krivača is being constructed in mountain area, where winters tend to be cold and unpleasant. Precisely for this reason, works were executed at high speed this summer.

“During summer months, our teams brought to an end the civil engineering works on construction of 33/110 kV transformer facility WP Krivača and completed construction of new transmission line bays in substations Veliko Gradište and Neresnica. Following completion of these works, we started with construction of distribution facility in WP Krivača, furnishing the transformer facility of the WP Krivača with electrical equipment and construction of 110 kV transmission line CDP Krivača-SS Veliko

### SERVING THE COMMUNITY

Wind park Krivača is being built in a part of Serbia which is by many regarded as the most beautiful and the most mystical part of the country. This region is insufficiently developed and has a great potential.

Newly constructed road sections will open new possibilities for development of tourism. Visitors will more easily make pleasant tours through the nature in a region which offers phenomenal views of entire Braničevo District and the Danube at its widest point in entire flow.

Construction of two transmission lines will also strengthen power distribution system in this part of Serbia, thus increasing power supply quality and reliability for the final users.

Gradište and transmission line CDP Krivača-SS Neresnica, in total length of 40 km, to connect the new wind park to existing power transmission network”, said Stefan Golubović, Head of Power Plants Division at Elnos Serbia.

It is also important to note that Elnos Serbia has been entrusted with preparation of design documentation needed for construction of all power facilities and for obtaining all necessary permits to put the facility into service.

### CULMINATION OF THE WORKS IS YET TO COME

Construction of wind park Krivača is an important opportunity for Elnos Serbia teams to once more confirm their capacity to adhere to the highest standards of electrical engineering and renewable energy sources. This is a highly dynamic project and will require engagement of a wide range of Elnos Group resources.

Works are expected to culminate next spring and summer. Almost entire operation team of Elnos Serbia is planned to be engaged on this site at that time.

Construction of wind park Krivača is to be completed in the second half of 2023. At that time, the wind park should start producing and delivering electrical power to the distribution network of Serbia.

**VJETROPARK BOGOSLOVEC** WIND PARK BOGOSLOVEC

# JOŠ ZELENE ENERGIJE

MORE PURE ENERGY



**U ZAHUKTAJU I UZBUDLJIVOJ RADNOJ ATMOSFERI EKIPE** *Elnosa Sjeverne Makedonije* za deset mjeseci izgradile su elektroenergetske objekte bez kojih bi budući rad vjetroparka Bogoslovec (36 MW) bio nezamisliv. Ovo je priča o velikoj zelenoj avanturi koja se odvijala samo 80 kilometara jugoistočno od Skoplja.

**IN A WARMED UP ATMOSPHERE FULL OF THRILL AND EXCITEMENT,** *Elnos North Macedonia* teams managed to construct power facilities without which future operation of wind park Bogoslovec (36 MW) would be unimaginable. And they did that in 10 months. This is a story about great green adventure happening only 80 kilometers southeast of Skopje.

**SR** Vjetropark Bogoslovec gradi se na površini od 70 hektara, imaće osam vjetrenjača po 4,5 MW instalisane snage. Izgradnja „krvotoka“, odnosno elektroenergetskih elemenata koji će povezivati njegove vjetroturbine sa elektroenergetskom mrežom, bila je jedan od prioritetsnih zadataka u okviru ovog projekta.

Upravo ovaj zadatak povjeren je ekipama Elnosa Sjeverne Makedonije, čime su one postale važan dio njenog BoP tima.

U rekordnom roku naši timovi izgradili su priključni dalekovod 2x110 kV u dužini od 4,6 km na trasi od 33/110 kV trafostanice Bogoslovec do postojećeg 110 kV dalekovoda TS Štip-TS Ovče polje te srednjenačku mrežu za povezivanje vjetroturbina sa novom trafostanicom Bogoslovec.

## NA VISINI ZADATKA

Naše ekipe su realizujući ovaj projekat položile 35 kilometara SN kablova, koji će prenosi energiju od turbina do trafostanice, te realizovale radove na izradi uzemljenja za temelje vjetroturbina.

Radilo se pod pritiskom kratkih rokova i nerijetko u teškim vremenskim uslovima, a

na vrhuncu radova broj ljudi na terenu sezao je i do 35.

„Kompletan projekat završen je sa ljudima zaposlenim u članici Elnos Sjeverna Makedonija, koji su za vrijeme njegove realizacije bili maksimalno profesionalni, odgovorni i posvećeni. Ponosan sam što nam je u okviru izgradnje vjetroparka Bogoslovec dodijeljen veoma važan dio posla, koji smo odlično uradili“, rekao je Martin Spasovski, tehnički direktor Elnosa Sjeverne Makedonije.

Vjetropark Bogoslovec bi, prema usvojenoj dinamici, trebalo da počne s radom sredinom naredne godine. Ovo je drugi vjetropark u Sjevernoj Makedoniji. Naše ekipe su prije devet godina bile važan link izgradnje i prvog vjetroparka u ovoj zemlji – vjetroparka Bogdanci (36,8 MW).

**EN** Wind park Bogoslovec is being constructed on 70 acres of land. It will have eight wind turbines, each with installed power of 4,5 MW. Construction of the “bloodstream” i.e. electrical energy connections between the wind turbine and the electrical power network, was one of the top priorities on this project.



Izgradnja 2x110 kV DV za vjetropark Bogoslovec (36 MW)  
Construction of 2x110 kV TL for wind park Bogoslovec (36 MW)



Ekipe na zadatku  
Teams on a mission



### BLAŠKO LAZAREVSKI

**Izvršni direktor kompanije Thor Impex,  
koja je investitor projekta**  
Chief Executive Officer at Thor Impex,  
investor on the project

**SR** „Kompanija Elnos imala je najprofesionalniji, najbolje opremljeni i stručan tim na licu mjesta. Nadzemni vod izgrađen je besprijekorno i prije roka, dok je kabliranje izvršeno po najsvremenijim standardima. Saradnja vaših inženjera sa ostatkom BoP tima takođe je bila veoma plodonosna tako da su svi problemi u radu svedeni na minimum. Preporučio bih Elnos svakom investitoru sličnih energetskih projekata u regionu.“

**EN** “Company Elnos had the most professional and best equipped expert team on the site. Overhead transmission line was constructed impeccably and before previously determined time for completion. Instalation of cables was performed in accordance with latest standards. Cooperation of your engineers with the remaining part of BoP team was very fruitful and all problems in every day work were reduced to a minimum. I would highly recommend Elnos to any investor on similar projects in the region”.

Precisely this task was assigned to Elnos North Macedonia teams, making them an important part of the BoP team.

In a record time, our teams constructed 2x110 kV connecting transmission line in length of 4,6 km on a route from 33/110 kV substation Bogoslovec to existing 110 kV transmission line SS Štip-SS Ovče polje, as well as middle-voltage network for connection of wind turbines with new substation Bogoslovec.

### EQUAL TO THE TASK

During realization of this project, our teams laid 35 kilometers of MV cables, forming a powerful network to supply the wind park. They also installed grounding for the wind turbines.

The pressure was high. The deadlines were strict and short. Weather conditions were often quite difficult and, at the peak of the project, number of people working on the site amounted to 35.

“Entire project was completed with engagement of Elnos North Macedonia staff exclusively. Our workers demonstrated maximum level of professionalism, responsibil-

ity and dedication during execution of these works. I am proud that such an important part of works on construction of wind park Bogoslovec was assigned to us. I am even more proud of the works performed”, said Martin Spasovski, Director of Operations at Elnos North Macedonia.

According to the adopted time schedule, wind park Bogoslovec should be commissioned in the middle of next year. This is the second wind park in North Macedonia. Nine years ago, our teams were also an important link in construction of the first wind park in the country – wind park Bogdanci (36,8 MW).

### BENEFITI

Vjetropark Bogoslovec u budućnosti će proizvoditi električnu energiju za 20.000 domaćinstava. Ekološke studije predviđaju da će njegova izgradnja doprinijeti smanjenju emisije ugljen-dioksida za 87.000 tona godišnje.

### BENEFITS

In future, wind park Bogoslovec will produce electricity for 20.000 households. Environmental studies foresee that construction of the wind park will contribute to reduction of carbon dioxide emissions by 87.000 tons per year.



SE Bukovica – prvi veliki izazov u Hrvatskoj | SPP Bukovica – the first big challenge in Croatia

**SOLARNA ELEKTRANA BUKOVICA**  
SOLAR POWER PLANT BUKOVICA

# SUNCE UVIJEK SIJA UZ JADRAN

**THE SUN IS ALWAYS SHINING  
ALONG THE ADRIATIC COAST**

**SOLAR JE FAVORIT ZELENE TRANZICIJE** i borba za njegove „zlatne“ megavate u EU u punom je jeku. Gradeći solarnu elektranu Bukovica (6,25 MWp) u Hrvatskoj, naši timovi napravili su nov i važan korak u ovoj dinamičnoj OIE oblasti.

**SOLAR ENERGY IS THE MOST FAVORITE** segment of a green transition. The fight for its “golden” megawatts is at full speed. By constructing solar power plant Bukovica (6,2 MWp) in Croatia, our teams made a new and important step in the highly dynamic RES segment.

**SR** Miris mora i žarke zrake sunca na licu, prva su dva snažna utiska koja preplave svakog po dolasku u Zaton Obrovački, malo mjesto koje se nalazi na 50 kilometara udaljenosti od Zadra.

Upravo je velika snaga sunčevog zračenja, odnosno solarni potencijal ovog kraja, odredila Zaton Obrovački za lokaciju izgradnje elektrane Bukovica.

Solarna elektrana će se prostirati na površini od 7,25 hektara i posjedovaće snagu od 6,25 MWp. Sa početkom izgradnje solarne elektrane Bukovica naše ekipе zakoračile su u izvođenje prvog projekta iz oblasti obnovljivih izvora energije u Hrvatskoj.

## NA ZADATKU

Posao Elnos Grupe u okviru izgradnje solarne elektrane Bukovica je izgradnja dvije trafostanice. Jedna je 35/0,8 kV PVPMs (Photovoltaic Plant Main Substation) trafostanica snage 2,8 MVA i ona je glavni link za povezivanje solarne elektrane na elektroenergetsku mrežu. Druga je 35/0,8 kV PVFTs (Photovoltaic Field Transformer Station) trafostanica snage 2,8 MVA.

Zadatak naših ekipa obuhvata isporuku i montažu elektroopreme za trafostanice, integraciju SCADA sistema, podešavanje sistema relejne zaštite te faze ispitivanja solarne elektrane i ispitivanja opreme u trafostanicama.

Pored radova na trafostanicama, u opis radova naših ekipa spadaju poslovi montaže potkonstrukcije za solarne panele, solarnih panela i invertora te nabavke i polaganja srednjenačnih i niskonaponskih kablova.

„Elnos Grupa će realizacijom poduhvata iz oblasti solara potvrditi novi nivo operativnosti i dodatno osnažiti portfolio u oblasti obnovljivih izvora energije i to u oblasti solarnih elektrana. Graditi solarnu elektranu Bukovica za nas je od samog početka bila prilika da realizujemo nov i zanimljiv projekt. Nakon vrelog ljetnog perioda pred našim timom je izvođenje radova u nesvakidašnjem zimskom ambijentu. Naime, ova regija je poznata po snažnim burama tako da ćemo naš angažman prilagodavati novim specifičnim klimatskim uslovima ovog terena“, rekao je Petar Todorović, vodeći inženjer Elnosa BL Banjaluka.

Radovi naših ekipa na ovom terenu su počeli u julu ove godine i, prema planiranoj dinamici, treba da bude okončani u martu naredne godine.

**EN** The smell of the sea filling the nostrils and sunbeams splashing your face are the first two strong impressions everyone gets when coming to Zaton Obrovački, a small village located 50 kilometers from Zadar.

It is exactly this strong power of the sun, i.e. solar potential of this region, that made Zaton Obrovački the best location for construction of the plant Bukovica.

The solar power plant will occupy 7,25 acres of land. The capacity will be 6,25 MWp. Commencement of works on construction of the solar power plant in Bukovica is, at the same time, the start of the first RES project our teams are performing in Croatia.

## ON A MISSION

Within the construction of the solar power plant Bukovica, Elnos Group has been assigned to construct two substations. One substation is 35/0,8 kV PVPMS (Photovoltaic Plant Main Substation), with a capacity of 2,8 MVA. It represents the main link between the solar power plant and the distribution network. The other substation is 35/0,8 kV PVFTS (Photovoltaic Field Transformer Station), also with a capacity of 2,8 MVA.

Our teams have a task to deliver and install electrical equipment for substations, integrate SCADA system, set relay protection system and test the solar power plant and equipment in the substations.

Apart from works to be done on the substations, our teams will also perform installation of solar panels, substructure for solar panels and inverters and will procure and lay middle-voltage and low-voltage cables.

“Through its engagement in solar energy endeavors, Elnos Group is once more confirming a new level of competence in operation and is additionally strengthening its RES portfolio in the sector of solar power plants. Building a new solar power plant Bukovica has from the beginning been an opportunity for us to perform a new and interesting project. The hot summer season is behind us but now our teams are preparing to perform works in an unusual winter environment. Namely, this region is known for its strong bora winds. Thus, we will be forced to adapt our engagement to

these very specific climate conditions”, said Petar Torodović, a Senior project engineer in Elnos BL Banjaluka.

Our teams started with execution of works on this site in July this year. According to the time schedule, the works are to be completed in May following year.

## 2.600 HOURS OF SUNSHINE PER YEAR

Thanks to its geographical position, Croatia has a high average annual insulation. More precisely, with 2.600 hours of sunshine per year, it belongs to a group of European countries with the largest solar potential. Despite this fact, the share of solar power in the total production of electrical power in this country is less than one percent. Share of renewable energy sources in total electrical energy consumption in Croatia is not low. Actually, 29 percent of total electrical energy comes from RES, which is above EU average. However, most of its renewable energy is produced by old hydro power plants. As a consequence, the focus has lately been placed on construction of small, privately-owned solar power plants.

## 2.600 SUNČANIH SATI GODIŠNJE

Zbog svog geografskog položaja, Hrvatska ima visoku prosječnu godišnju osunčanost te je među evropskim zemljama s najvećim solarnim potencijalom od čak 2.600 sunčanih sati godišnje.

Uprkos tome, udio solarne energije u ukupnoj proizvodnji energije u ovoj zemlji je manji od jedan odsto.

Hrvatska ima visok udio obnovljivih izvora energije u ukupnoj potrošnji, pa tako iz obnovljivih izvora proizvodi čak 29 odsto energije, što je svrstava iznad prosjeka EU. Ipak, gotovo 80 odsto njene obnovljive energije proizvode stare hidroelektrane, te je zato u posljednje vrijeme veliki naglasak stavljen na gradnju malih solarnih elektrana u privatnom vlasništvu.

Ljeto na terenu | The site in summer





Zoran Kukobat, direktor Elnos Srbije Zoran Kukobat, Director of Elnos Serbia

# Znanje je odgovor na izazove energetike budućnosti

KNOWLEDGE IS THE RESPONSE TO FUTURE CHALLENGES  
IN ELECTRICAL ENGINEERING

**ELEKTROENERGETIKA** bilježi konstantan i nikad brži rast. Ovakav trend otvara mnoštvo prilika i izazova, a Elnos Srbija spremna je na njih, kaže Zoran Kukobat, direktor Elnos Srbije. Naša članica sa beogradskom adresom danas je jedan od vodećih aktera energetske tranzicije Srbije, a Kukobat je s nama podijelio priču o ličnoj formuli profesionalnog uspjeha, ljubavi prema inženjeringu i trendovima energetike budućnosti.

**A CONSTANT AND EXTREMELY RAPID GROWTH** is recorded in the sphere of electrical engineering. This trend opens a series of new opportunities and challenges. Elnos Serbia is ready for them all, says Zoran Kukobat, Director of Elnos Serbia. Today, our Belgrade registered company is one of the leaders in energy transition in Serbia. Kukobat shared with us his story on his personal formula for professional success, love towards engineering and future trends in the domain of electrical power.

**SR Duže od godinu dana direktor ste Elnos Srbije. Da li se Vaša poslovna vizija iz vremena dolaska na čelo kompanije poklapa sa onim što živate i radite danas?**

Suštinski da, poklapa se, ali u detaljima svakako ima promena i razlika. Pre svega, one se odnose na metodologiju njenog ostvarivanja i prilagođavanja vremenu u kojem živimo. I poslovno i životno okruženje značajno se promenilo u poslednjih nekoliko godina. Dinamika tih promena je najizraženija upravo u poslednje dve godine. Načini na koje želimo da postavimo nove standarde, da unapredimo svoje poslovanje i da istovremeno učinimo život lepšim i sebi i drugima, više ne mogu biti isti. A suštinski i dalje želimo da budemo najbolji, da više znamo i umemo, da sve što počnemo uspešno i završimo, da na posao dolazimo s optimizmom i entuzijazmom i na kraju da kroz to u svoj privatni život donešemo sigurnost i zadovoljstvo.

**Šta je to što izdvaja Elnos Srbiju u odnosu na ostale kompanije? Koje su njene preferencijalne prednosti?**

Bez imalo sumnje, na prvom mestu to su naši zaposleni. Svi oni, ili bar ogromna većina njih, spadaju u red vodećih u svojoj struci i svakodnevno daju ozbiljan doprinos da budemo to što jesmo. A mi smo već dugi niz godina izuzetno uspešna i u svojoj oblasti delovanja jedna od najrespektabilnijih kompanija. U tehničkim sektorima imamo izuzetno dobar spoj mladih inženjera i nekoliko eminentnih starijih kolega za koje možemo reći da su prave enciklopedije znanja. I u ostalim sektorima, za koje se često misli da su manje važni, a zapravo su u najmanju ruku podjednako bitni, imamo niz vrlo kreativnih stručnjaka. Naša druga velika prednost je poslovanje unutar Elnos Grupe. To nam omogućava izuzetnu fleksibilnost kada je u pitanju planiranje svih vrsta resursa, ali i mnogo uspešniji nastup na postojećem tržištu.

**Šta su najveći izazovi s kojima se kompanija trenutno suočava?**

Nekoliko velikih izazova trenutno je pred nama. Oni su manje-više globalnog karaktera i praktično su zajednički i za sve ostale kompanije. Pre svega je to nestabilnost tržišta. U prethodnih godinu dana došlo je do izuzetno velikih promena cena u svim oblastima. Značajno su poskupeli repromaterijali, gotovi proizvodi, energetici, transport itd. I taj trend nije završen. Deo tih poskupljenja jeste realan i uzrokovani je nedostatkom energenata i sirovina, ali sa druge strane postoji i onaj deo koji ima špekulativni karakter. U našoj branši pro-

jekti obično počinju da se realizuju i do godinu ili dve nakon davanja obavezujuće ponude i potpisivanja ugovora. To nas na nekima od njih stavљa u izuzetno težak položaj. Drugi veliki izazov je što je stalni rast kompanije u disproporciji s okolnostima na tržištu rada u praktično svim oblastima, bilo da su u pitanju inženjeri, pravnici, ekonomisti, rukovodioci mašinama, majstori u raznim zanatima ili administrativni radnici.

**Koji su najznačajniji projekti u kojima Elnos Srbija trenutno učestvuje i šta možemo očekivati u budućnosti?**

Posebno bih istakao projekat izgradnje vetroelektrane Krivača (103 MW), prve južno od Save i Dunava. Pored njega, za nas je veoma važan projekat izgradnje dvosistemskog 110 kV dalekovoda TS Kraljevo 3-TS Novi Pazar 1. Ipak, po mom mišljenju, trenutno najznačajniji projekat je proizvodnja, isporuka i puštanje u rad distributivnih trafostanica za napajanje gradilišnih mašina i mehanizacije na projektu HS2 u Velikoj Britaniji. Ovo je najveći infrastrukturni projekat u ovoj zemlji i jedan od najvećih u Evropi. Biti deo toga je nešto na što smo veoma ponosni. Naš fokus u narednom periodu biće na izgradnji kapitalnih objekata u oblasti OIE, gde posebno izdvajam projekte u oblasti hidroelektrana. Takođe, tu je i učešće na velikim projektima u infrastrukturi, pre svega na železničkim i gradskim kontaktnim mrežama.

**U kojim trenucima ste u svojoj dosadašnjoj karijeri najviše učili?**

**Šta Vas je najviše inspirisalo?**

Učenje je konstantan proces. Što više učite, svesniji ste skromnosti svog znanja. Fakultet vam sam po sebi ne daje veliko funkcionalno znanje, ali vas pripremi za ubrzano sticanje novih znanja. Nakon završetka studija najveći izazov mi je bilo stručno usavršavanje. Moram da priznam da sam bio u zabludi misleći da je to najvažnije što mogu da naučim. Kasnije, kroz karijeru, shvatilo sam da je ništa manje važno učenje i izgradnje sebe u socijalnom i opšteobrazovnom smislu. Zapravo, samo kombinacija svega toga može da dovede do uspeha. Inspiracija za učenje i rad na sebi, i ranije i sada, uvek su mi bili oni koji više znaju, više umiju i, generalno, brže i bolje rade. Svako od nas, ako se osvrne oko sebe, videće mnogo ljudi koji mogu biti inspiracija za različite stvari i od kojih se može mnogo toga naučiti, bez obzira na njihov obrazovni, socijalni ili društveni status. Limite svog znanja postavljamo sami i zato se trudim da um ostavim otvorenim.

**Šta je ono što najviše volite u inženjeringu?**

Inženjering je veliki izazov. Zahteva veliko znanje, temeljnost, metodičnost, veliku energiju i ogroman trud. Morate kao tim da imate multidisciplinarna znanja, ne samo u inženjerskom i tehničkom smislu, već i u pravnom, finansijskom, logističkom i svakom drugom segmentu poslovanja. I morate da imate taj skup vrhunskih individualaca koji se međusobno razumeju, uvažavaju i zajedno rade sa istim ciljem. Imate četiri ključne faze, a to su: ugovoriti, projektovati, izgraditi i pustiti u rad. Kao inženjer, uvek sam najviše voleo onu fazu koja dolazi na kraju, a to je puštanje objekta u rad. Tada sve ono što ste radili i sva energija koju ste uložili dobija svoj smisao. To je trenutak kada shvatite da ste od prostora na kojem nije bilo ništa stvorili nešto vredno i korisno i da ste dali neki svoj mikrodoprinos boljem društvu. Sa druge strane, biću iskren, menadžeru kompanije najvažniji je trenutak potpisivanja ugovora, kada ste zajedno sa svojim saradnicima dali svim zaposlenima šansu da stvore nešto novo.

**Da li smatrate da ste u poslu više timski igrač ili individualac?**

Rekao bih, podjednako i jedno i drugo. Smatram da čovek koji želi biti uspešan u poslu mora istovremeno biti i dobar individualac i timski igrač. Svi smo mi prirodno individualci, a naš uspeh suštinski zavisi od toga da li umemo tu individualnost da stavimo u funkciju tima. Nema dobrog tima bez vrhunskih individualaca, posebno u inženjeringu, ali i u ostalim branšama. Ono što je za menadžera važno jeste da prepozna individualne vrednosti svojih saradnika i da ih uklopi u dobar i efikasan tim. Praktično, da od svakoga od njih izvuče maksimum. Takođe, menadžer svakako mora da bude dobar individualac, ali i da shvati da je on samo deo tima, koji u tom trenutku i u tom timu ima najveću odgovornost.

**Koje oblasti elektroenergetike su, po Vašem mišljenju, danas nosioci najvećeg budućeg potencijala?**

Elektroenergetika je oblast sa konstantnim i verovatno nikad bržim rastom. Recesija, koja je skoro izvesna nakon svih događanja u svetu u prethodne tri godine, verovatno će u dobroj meri zaobići ovu privrednu granu. I to je globalni trend. Upravo ovaj nagli rast sistema za proizvodnju, prenos i distribuciju električne energije, kao i činjenica da u mreži imamo sve veći broj intermitentnih izvora, daje poseban značaj upravljanju elektroenergetskim sistemima i njihovim celinama. To se posebno odnosi na upravljanje proizvodnjom i potrošnjom.

Brzina obrade ogromnog broja informacija i automatizacija upravljanja na osnovu dobijenih rezultata biće sve bitnije i od toga će sušinski zavisiti stabilnost sistema i racionalizacija potrošnje i proizvodnje. Verujem da je to trenutno najveći izazov u elektroenergetici.

#### **Gdje vidite Elnos Srbiju i Elnos Grupu u budućnosti? Šta bi najviše moglo uticati na budući razvoj kompanije?**

Elnos Srbiju, kao i generalno Elnos Grupu, vidim pre svega kao lidera u projektovanju i izgradnji kapitalnih elektroenergetskih objekata u praktično svim njenim granama. Elnos vidim upravo na čelu ubrzane izgradnje novih proizvodnih i prenosnih kapaciteta. Mi smo odavno prerasli lokalne okvire i dalje pozicioniranje na novim tržištima u EU je, svakako, cilj sam po sebi. Imamo konstantan rast i napredak, kako u tržišnom tako i u organizacionom smislu. Prepoznavanje potreba društva i delovanje unapred, kroz razvoj i realizaciju projekata koji će dovesti do daljeg razvoja kompanije i boljeg životnog okruženja, su imperativ. A to podrazumeva rad na sebi, stvaranje okruženja u kompaniji koje podstiče zaposlene da konstantno napreduju. Takođe, neophodno je da prepoznamo talentovane ljude kako bi oni videli našu kompaniju kao najbolju za unapređenje njihovog kvaliteta života i rada. Poslovno okruženje je povoljno, imamo viziju kuda idemo i gde želimo da budemo, imamo stručnjake u svim oblastima poslovanja, tako da naš razvoj zavisi isključivo od nas samih i energije koju u to uložimo.

#### **EN You have been the Director of Elnos Serbia for over a year now. Does the vision you had when you became the head of the company coincide with what you are doing and how you are living today?**

In its essence, yes, but details vary and differ of course. This primarily refers to the methodology used to achieve the vision, and its adaptation to the time we are living in. Both personal and business environment have changed a lot in recent years. The dynamics of these changes became most prominent in the last two years. As a consequence, the manner in which we wish to set new standards and improve our business, making our lives and the lives of those around us better, can no longer be the same. At the same time, essentially, we still want to be the best, to know more, to do more, to complete with success every action we take, and to come to work with enthusiasm, all of this finally resulting in feelings of safety and pleasure in our private lives.

#### **What makes Elnos Serbia stand out among other companies? What are its preferential advantages?**

It is primarily our employees. There is no doubt. All our employees, or at least a great majority of them, are leading professionals in their fields of expertise. They contribute enormously to what we are and what we have been for years – an extremely successful and one of the most reputable companies in this sphere. In our technical sectors, we have an excellent combination of young engineers and prominent, more experienced colleagues, who are, I am free to say, a true encyclopedia of knowledge. Other sectors of our company, many of which are often considered as less important, yet are at least equally important as the technical sector, also gather very creative professionals. Our second most important advantage is the way business is done within Elnos Group. It allows us to be very flexible when planning any type of resources and also very successful when acting in the current market.

#### **What are the greatest challenges the company is facing at the moment?**

Several big challenges are now before us. They are more or less global and, practically, common for all companies. First, it is the unstable market. Serious changes have occurred in the last several years in all areas. Production materials, final products, energy products, transport – prices of all these went up significantly. This trend has not ended yet. This increase in price is realistic in some cases and has been caused by the lack of raw materials and energy products. However, there are also cases where prices have increased as a result of speculations in the market. In our sector, projects generally commence a year or two after a binding offer is submitted and a contract is signed. As a consequence, we have been put in an uncomfortable position in some projects. The second big challenge we are facing is the constant growth of our company which is not consistent with the prevailing conditions of the labor market, practically in all its aspects – engineering, law, economy, machinery operation, various trades and administration.

#### **What are the most significant projects Elnos Serbia is currently participating in and what can we expect in the future?**

I would particularly like to emphasize the construction of wind park Krivača (103 KW), the first one to be constructed south of the Sava and the Danube. Construction of 110 kV double circuit transmission line SS Kraljevo 3 –

SS Novi Pazar 1 is also an important current endeavor. However, what I believe is the most significant project at the moment, is the production, delivery and commissioning of distribution substations intended to provide power supply for site mechanization on project HS2 in Great Britain. This is the largest infrastructural project in that country and, at the same time, one of the biggest projects in Europe. Being a part of it is something we are most proud of. In years to come, we plan to focus on construction of capital RES facilities, with a particular focus on hydro power plant projects. Also, we intend to participate in large infrastructural projects, especially concerning railways and contact networks in urban areas.

#### **At what points in your career did you learn most? What inspired you?**

Learning is a constant process. The more you learn, the more you become aware of how humble your knowledge is. The faculty, in itself, does not give you much functional knowledge but rather prepares you to acquire new knowledge more rapidly. After I finished my studies, professional development became the greatest challenge. I must admit it was misleading to think that specific professional knowledge was the most important thing I had to acquire. Later on, throughout my career, I realized that developing yourself in the social context and gaining more general knowledge are equally important. Actually, it is only the combination of all the above that can lead you to success. My inspiration for learning and personal development were, and continue being, those who know more, who can do more and who, generally speaking, work better and faster. When we look around, each one of us can see many people who can serve as an inspiration for many different things. We can also learn from such people, irrespective of their education or social status. We limit our knowledge. That is why I try to keep my mind open.

#### **What is it that you like most about engineering?**

Engineering is a big challenge. It requires extensive knowledge, thoroughness, a methodic approach, a lot of energy and enormous effort. As a team, you have to possess multidisciplinary knowledge, not only in terms of engineering and technics but also in legal, financial, logistical and every other aspect of the business. You also must form a team of top experts who understand and respect each other and work together towards a common goal. There are four key stages: contracting,

designing, building and commissioning. As an engineer, I always preferred the last phase i.e. the commissioning. That is when everything you did and all the energy you invested make complete sense. At that moment you realize that you have created something useful, a value, on what used to be a useless, barren area. That way, you contribute to creation of a better society. On the other hand, let me be frank, signing a contract is the most important moment for every manager, because you and your associates gave your employees a chance to create something new.

#### **Do you consider yourself more of a team player or an individual contributor?**

I would say I am both, in equal shares. I believe that a person who wishes to be successful in business must be a strong individual yet a team player too. We are all natural individuals and our success depends on whether we are able to put our individuality in service of a team. There is no good team without top individuals, in all fields but especially in engineering. It is important for managers to recognize the individual values of the people they work with and to fit them into a good and efficient team. This practically means getting the most out of your team members. At the same time, a manager must be a strong individual, knowing, however, that he or she too is just a part of the team,

the one that carries the greatest responsibility at that particular moment.

#### **Which segments of electrical engineering do you believe carry the greatest potential for the future?**

Electrical engineering is developing constantly. The development has probably never been faster than it is now. Recession, which can almost certainly be expected after all the events that occurred in the world during the last three years, will probably to a large extent circumvent this branch of industry. This is a global trend. Precisely this sudden growth of the systems for production, transmission and distribution of electrical energy, combined with a constantly increasing number of intermittent energy sources, increases the importance of proper management of electrical engineering systems and their units. This particularly refers to the management of production and consumption. The speed at which enormous quantities of data are processed and the automation of management systems based on the results obtained will become very important, actually crucial in their essence for the stability of the system and rationalization of production and consumption. I believe this is currently the biggest challenge in electrical engineering.

#### **How do you see Elnos Serbia and Elnos Group in the future? What could have the biggest impact on the future development of the company?**

I see Elnos Serbia, and Elnos Group generally, as leaders in the design and construction of capital electrical power facilities in all business segments of the company. I see Elnos at the forefront of accelerated construction of new production and transmission capacities. We have long ago outgrown the local framework. Further positioning in new EU markets is a reasonable goal. We are growing and progressing constantly in terms of both, the market and our internal organization. Recognizing what society needs and acting forward by means of realization of projects that will lead to further development of the company and improved living conditions are imperative. This implies working on oneself and creating an environment within the company that supports progress of its employees. Also, it is necessary to recognize talents who would, in return, perceive our company as the best way to improve the quality of their work and their life. Our business environment is favorable, we have a clear vision of where we are going and where we want to be, and we have experts in all business segments. This means that our development depends on us and us only and on the energy we invest.

Uspjeh dolazi kada individualnost stavimo u funkciju tima Success comes when individuality is put in the service of the team





# NAŠA NOVA ČLANICA ELNOS POLJSKA

OUR NEW MEMBER – ELNOS POLAND

**POSLOVNI PUTEVI** ove godine usmjerili su nas u središte Evrope – u Poljsku. U ovoj zemlji, poznatoj po prirodnim resursima i ljepotama, Elnos Poljska ima zadatak da potvrdi našu prepoznatljivu formulu rada.

**THIS YEAR**, our business roads took us to the very heart of Europe – Poland. In this country, known for its natural beauties and resources, Elnos Poland has a task to reconfirm the success of our recognizable business formula.

**SR** Nakon što smo u prošloj godini otvorili vrata dva veoma važna zapadnoevropska tržišta – Velike Britanije i Danske – Elnos Grupa je ove godine svoj fokus usmjerila u geografsko središte Evrope, u Poljsku. Ova zemlja veoma ozbiljno napreduje na OIE planu i u budućnosti će biti strateški važna za razvoj novih projekata i pojačanje naših EU timova koji sada posluju u 17 zemalja.

Centrala Elnos Poljske je u Poznanju, jednom od najstarijih i najpoznatijih gradova u Poljskoj. Ovaj grad je, između ostalog, važan privredni centar ove zemlje i bitan evropski saobraćajni čvor.

Tržište Poljske je nov i veliki izazov i Elnos Grupa ovaj iskorak pravi s velikim planovima i ambicioznim očekivanjima.

„Cilj nam je da Elnos Grupa bude prepoznata kao pouzdana evropska kompanija iz oblasti elektroenergetike. Namjeravamo saraditi sa regionalnim operaterima distributivne mreže u našoj zemlji, a izuzetno nam je važno i da damo svoj doprinos u realizaciji projekata proširenja elektroenergetske mreže, u čemu Elnos Grupa ima veliko iskustvo i značajne reference“, rekao je Marek Suhora, direktor Elnos Poljske.

Pred novoformiranim članicom je izazovan period, posebno kada se ima u vidu trenutna energetska kriza u Evropi i svijetu.

„Poljska je danas snažno angažovana na obezbjeđivanju energetske stabilnosti zemlje, zbog čega se izrađuju nacionalni investicioni planovi za proširenje elektroenergetske mreže. Upravo na ovom planu vidimo našu priliku u nekoliko sljedećih godina. Takođe, moram naglasiti da želimo podržati projekte na kojima je Elnos Grupa angažovana i u drugim zemljama i da će naši timovi biti vjetar u leđa za rad na svim tržištima Grupacije. Bićemo usmjereni i na projekte čiji rezultat će biti izgradnja modernijeg, efikasnijeg i sigurnijeg elektroenergetskog sistema Poljske“, rekao je Suhora.

Nova tržišta i rad na izazovnim i kompleksnim projektima su formula koja Elnos Grupu čini liderom u sektoru elektroenergetike. Isporan poslovni recept ne treba mijenjati, tako je cilj Elnos Grupe da nastavi širenje poslovanja i osigura najviši nivo usluga našim partnerima širom regije i Europe.

**EN** Last year, we opened the doors to two new and very important West European markets – Great Britain and Denmark. This year, Elnos

Group has set its eye on Poland, the geographical center of Europe. The progress this country has made so far in the area of renewable energy resources is remarkable. In the future, it will become strategically important for development of new projects and strengthening of our EU teams who now work in 17 different countries.

Head office of Elnos Poland is registered in Poznań, one of the oldest and most famous cities in Poland. Above its other characteristics, this city is an important commercial center of the country and a crucial transport hub in Europe.

The market of Poland is a new challenge for Elnos Group and a big one too. We are stepping into it with great plans and ambitious expectations.

“Our goal is to make Elnos Group recognizable as a reliable European electrical engineering company. We plan to cooperate with regional power transmission companies in the country and to give our contribution in realization of power distribution network expansion projects, where Elnos Group has extensive experience and significant references“, said Marek Suchora, Country Director of Elnos Poland.

An extremely challenging period is before our new member, even more so considering current energy crisis in Europe and the world.

“Today, Poland engages significant efforts to secure energy stability of the country. For this reason, new national investment plans are being prepared with the aim to expand the electrical power network. It is exactly in this segment where we see our opportunity for growth in the following couple of years. Also,

I have to emphasize that we wish to support projects on which Elnos Group has already been engaged in other countries as well, making our teams a wind at the back of all markets where our Group operates. We will be focused on the projects whose successful completion will result in a more modern, efficient and secure power supply system for Poland“, said Suchora.

New markets and engagement in challenging and complex projects is the formula that makes Elnos Group a leader in the electrical energy sector. A well-tried and tested recipe in business should not be changed. Thus, the goal of Elnos Group is to continue expanding its business and to secure the highest level of service for our partners throughout the region and Europe.

## FIVE INTERESTING THINGS ABOUT POLAND

We start this list with a fact that Poland is the ninth largest country in Europe. Constitution of this country is the oldest in Europe and the second oldest in the world.

17 Nobel Prize winners have been born in Poland, which is more than South America, China and India. Almost 90 percent of Poles have high school education, which is the highest percentage in EU. Nearly all foreign movies have been synchronized, with one man giving voice to all characters.

Most common name for a dog in Poland is Burek.

Naš tim u Poznaju Our team in Poznań



### PET ZANIMLJIVOSTI O POLJSKOJ

Zanimljivosti o Poljskoj započinjemo činjenicom da je ona deveta zemlja po veličini u Evropi. Ustav ove zemlje najstariji je u Evropi i drugi je po starosti u svijetu. Čak 17 dobitnika Nobelove nagrade rođeno je u Poljskoj, što je više od broja nobelovaca iz Južne Amerike, Kine i Indije. Gotovo 90 odsto Poljaka ima završenu srednju školu, što je najbolji procenat u cijeloj EU. Skoro svi strani filmovi u ovoj zemlji su sinhronizovani i to na način da jedan čovjek daje glas svim likovima.

Najčešće ime za psa u Poljskoj je Burek.

PRVA DESENJA ELNOS NORDICA THE FIRST DECADE OF ELNOS NORDIC

# Jedinstven brend na ŠVEDSKOM TRŽIŠTU

A UNIQUE BRAND IN THE  
SWEDISH MARKET



**SVOJOM ORIGINALNOM FORMULOM ŠVEDSKA** već dugo piše jednu od najuspješnijih energetskih priča na svijetu, a naša posvećenost energetskom putu ove zemlje ove godine napunila je prvu deceniju. Danas ovu zemlju zovemo naša druga kuća, a evo i zašto...

**USING THEIR ORIGINAL FORMULA, SWEDEN** has long been writing one of the most successful electrical energy stories in the world and our dedication to the development of the electrical energy sector in this country had reached its first decade. Today, we call this country our second home, and here is why...

**SR** Adresa naše švedske članice Elnos Nordic proteklih deset godina je u Västeråsu, najvećem gradu i luci u unutrašnjosti ove zemlje. Upravo na ovoj adresi predstavnici mnogih nordijskih elektroenergetskih kompanija nalaze pouzdanog i profesionalnog partnera, uvijek spremnog da ispunji njihova očekivanja.

U prilog tome govorи činjenica da su u proteklih deset godina timovi naše kompanije uspješno realizovali više od 70 projekata, u okviru kojih su modernizovali neke od najsloženijih objekata i sistema elektroenergetske infrastrukture. Profesionalno, inovativno i odvažno, timovi Elnos Grupe ispisali su mnogo stranica uspjeha na tržištu ove zemlje.

#### NAŠ REZULTAT – 2.300 KILOMETARA DALEKOVODNE TRASE

Naše ekipe do sada su gradile i rekonstruisale oko 2.300 kilometara dalekovodnih trasa u Švedskoj, što je broj koji je ozbiljno premašio dužinu ove zemlje. U prethodnoj deceniji Elnosovi timovi za dalekovode našli su se u prvom planu više od 50 najznačajnijih i najizazovnijih energetskih projekata, među kojima je značajan broj kapitalnih. Elnos Grupa i Elnos Nordic do sada su u oblasti dalekovoda posebno ponosni na dostignuća u okviru projekata: DV 400 kV Hurva-Sege, DV 400 kV Hallsberg-Barkeryd (Jugozapadni link 2), DV 2x130 kV Storfinnforsen-Ögonfågnaden-Isbillstjärn, DV 400 kV Långbjörn-Storfinnforsen, te DV 2x130 kV Barkeryd-Nässjö.

#### TRAFOSTANICE – ČUVARI STABILNOSTI ZEMLJE

Do sada smo na tlu Švedske rekonstruisali više od 20 trafostanica koje su čuvari energetske stabilnosti ove zemlje.

U oblasti trafostanica naši najznačajniji poduhvati su: TS 130 kV Stävlö i Linsänkan, TS 420 kV FT76 Barsebäck, TS 130 kV Porjusberget te projekt „Aqua“, kojim su obuhvaćene tri 130 kV trafostanice - Ersbo, Tuna i Öby.

Kombinacija dosadašnjeg znanja i iskustva te konstantna ulaganja u ljudske i materijalne resurse potvrda su kvaliteta koji nam omogućava da se još bolje pозicioniramo u ovoj zemlji.

**EN** For the last ten years, the head office of Elnos Nordic, our Swedish member, has been registered in Västerås, the largest city and port in central Sweden. It is at this address where representatives of many Nordic electrical engineering companies continuously find a reliable and professional partner, always ready to meet their expectations.

What stands as a confirmation of this statement is the fact that, during the last ten years, our teams

have successfully completed more than 70 projects which included modernization of the most complicated electrical engineering infrastructure systems and facilities. In a professional, innovative and bold manner, Elnos Group teams have written a chapter of authentic professional success in this country's market.

#### OUR RESULT - 2.300 KILOMETERS LONG TRANSMISSION LINE ROUTE

So far, our teams have built and reconstructed approximately 2.300 km of transmission lines in Sweden, which is a number that seriously exceeded the length of this country. In the previous decade, Elnos teams were at the forefront of more than 50 most challenging and most important energy projects, a significant number of which were considered capital.

When it comes to transmission lines, Elnos Group and Elnos Nordic are most proud of the achievements involving the following projects: 400 kV TL Hurva-Sege, 400 kV TL Hallsberg-Barkeryd (Southeastern link 2), 2x130 kV TL Storfinnforsen-Ögonfågnaden-Isbillstjärn and TL 400 kV Långbjörn-Storfinnforsen and 2x130 kV TL Barkeryd-Nässjö.

#### SUBSTATIONS - GUARDIANS OF THE COUNTRY'S STABILITY

On Swedish soil, we have thus far reconstructed more than 20 substations serving as true guardians of the energy stability of the country.

The most significant projects in this area are: 130 kV SS Stävlö and Linsänkan, 420 kV SS FT76 Barsebäck, 130 kV SS Porjusberget and project „Aqua“ which included three 130 kV substations - Ersbo, Tuna and Öby.

A combination of knowledge and experience, topped with continuous investments in material and human resources, once again proved as a great method for even better positioning of our company in this country.



#### NENAD VUKOMANOVIC

**Tehnički direktor Elnos Nordica**  
Director of Operations at Elnos Nordic

**SR** „Naša Grupacija uspješno se svrstala u rang visokoprofesionalnih izvođača rada koji realizuju najzahtjevnije projekte rame uz rame sa vodećim evropskim i multinacionalnim kompanijama. Pored projekata izgradnje i modernizacije dalekovoda i trafostanica, koje uspješno realizujemo već deceniju, planiramo proširiti naša angažovanja u oblasti industrije i izvođenja građevinskih radova na elektroenergetskim objektima.“

**EN** “Our Group has successfully positioned itself among the most professional contractors performing the most demanding projects, shoulder to shoulder with leading European and multinational companies. Apart from the transmission line and substation modernization and construction projects we have been proficiently completing for a decade now, we plan to expand our business activities in the domain of industry and execution of civil engineering works on power facilities.”

Izgradnja 400 kV DV Hurva-Sege Construction of 400 kV TL Hurva-Sege



**PRVI JUBILEJ NAŠE SLOVENAČKE ČLANICE**  
FIRST JUBILEE OF OUR SLOVENIAN MEMBER

# VIŠE OD 360 PROJEKATA

MORE THAN 360 PROJECTS

## ENS SLOVENIJA

je najveća članica Elnos Grupe na evropskom tržištu. Ona ove godine slavi pet godina uspješnog i uzbudljivog poslovnog puta obilježenog odličnim rezultatima. Naša ekipa iz zemlje koju zovu „zeleno srce Evrope“ poručuje da se tek zahuktava za izazovne projekte budućnosti.

**ENS SLOVENIA** is our biggest member in European market. This year, they are celebrating five years of successful and thrilling business development, marked by excellent results. Our team from this country known as “the green heart of Europe” says they are just getting warmed up for future challenging projects.

## SR MOĆNI TIM ZA VRIJEME KOJE DOLAZI

Niko nije mogao pretpostaviti da će ENS u tako kratkom periodu od osnivanja realizovati više od 360 projekata.

„Prošlo je pet godina od kada je grupa od 17 ljudi, inženjera i vrhunskih montera specijalizovanih za izvođenje radova na visokonaponskoj i srednjenačkoj elektroenergetskoj mreži, odlučila da svoje znanje, sposobnosti i motivaciju ujedini u vlastitoj kompaniji. Naša volja poklopila se sa željom međunarodne Elnos Grupe za aktivni ulazak na slovenačko tržište. Zajedničkim finansijskim i stručnim snagama osnovali smo preduzeće Elektro novi sistemi (ENS), koje je danas široko poznato u elektroprenosnoj i distribucijskoj sferi“, rekao je Jure Jagrič, direktor ENS-a.

## ZA PET GODINA BROJ RADNIKA UDVOSTRУЧЕН

U istom vremenu broj radnika naše najveće evropske članice se više nego uduplao. ENS u svom sastavu ima grupu iskusnih, sertifikovanih montera za instalaciju 110 kV kablova, koja čini značajan dio portfolija kompanije za slovenačko i evropsko tržište. Timove ENS-a odlikuje visoka motivisanost, stručnost i istinsko majstorstvo multitaskinga, a zajedno sa ostalim ekipama Elnos Grupe do sada su bili dio projekata na Islandu, u Norveškoj, Holandiji, Crnoj Gori i Srbiji.

„Dok sa zadovoljstvom posmatramo naša dostignuća, naši pogledi usmjereni su ka budućnosti. Veliki izazov za nas predstavljaju i zeleni projekti, kao što su solarne elektrane, infrastruktura za električna vozila, pametne mreže i drugi projekti koji povezuju obnovljive izvore energije, uštedu i efikasnu upotrebu energije, kao i mogućnost integracije tih novih sistema

u postojeći elektroenergetski prenosni i distribucijski sistem“, navodi Jagrič.

## TOP 10

U bogatom portfoliju ENS-a izdvajaju se projekti rekonstrukcije i modernizacije dalekovoda, modernizacije i izgradnje trafostanica, rekonstrukcije i održavanja antenskih objekata za telekomunikacije te projekti u oblasti industrijske infrastrukture.

U velikom broju do sada realizovanih poduhvata u oblasti dalekovoda u ENS-u su poseban značaj dali realizaciji radova u okviru projekata: DV 2×110 kV TS Pivka-EVP Pivka, DV 400 kV Cirkovce-Pince (najveći projekt na 400 kV mreži u Sloveniji), DV 35 kV Jeznice-Kranjska Gora i DV 20 kV Zidani Most (demontaža realizovana uz podršku helikoptera). U oblasti trafostanica iz ENS-a izdvajaju rad na TS 400/220/110 kV Divača i TS 400/110-220/110 kV Cirkovce s raspletom dalekovoda. Projekti energetskog napajanja dvije fabrike kompanije Calcit u Gospicu u Hrvatskoj i holandskom gradu Terneuzenu takođe su posebno važni za ovu članicu. Radovi izvedeni u okviru prve fabrike bili su prvi samostalni projekat timova ENS-a, dok su radovi u holandskom Calcitu bili najveći poduhvat njenih ekipa van Slovenije.

I na kraju, iz ENS-a, u okviru deset najistaknutijih poduhvata do sada, ističu se montažni radovi na održavanju telekomunikacionog tornja RTV na Belom Križu visokog čak 105 metara i mjerene vibracije na 2×400 kV dalekovodu Beričevo-Okroglo.

## EN A POWERFUL TEAM FOR TIME TO COME

Nobody could have envisaged that, within such a short period since its foundation, ENS will complete more than 360 projects.

"It has been five years since a group of 17 people, engineers and highly skilled fitters specialized for works on high-voltage and middle-voltage electrical power network, decided to join their knowledge, skills and motivation and found their own company. Our will coincided with intention of Elnos Group, an already international company, to enter Slovenian market. We joined our financial and professional capacities and founded Elektro novi sistemi (ENS) which soon became a well-known player in the sphere of power transmission and distribution", said Jure Jagrič, Director of ENS.

## NUMBER OF EMPLOYEES DOUBLED IN FIVE YEARS

Within the same time period, number of employees in our biggest European member has more than doubled. ENS employs a group of experienced linemen certified for installation of 110 kV cables. They have contributed to formation of an important segment of company portfolio for Slovenian and European market. ENS teams are very proficient, extremely highly motivated and true masters of multitasking. Together with other Elnos teams, these teams have played their role on our projects on Iceland, in Norway, the Netherlands, Montenegro and Serbia.

"While happily observing our current achievements, we keep our focus on the future. Green projects, such as solar power plants, infrastructure for electrical vehicles, smart grids and other project which imply connecting renewable energy sources, energy saving and its efficient use, as well as possibility to integrate such nov-

elties in existing power transmission and distribution system, represent a great challenge for us", says Jagrič.

## TOP 10

ENS has a rich portfolio, where impressive transmission line reconstruction and modernization projects stand out together with construction of substations, reconstruction and maintenance of antenna facilities for telecommunication and industrial infrastructure projects.

Among a large number of endeavors in area of transmission lines, at ENS, they give a special importance to works carried out within following projects: TL 2×110 kV SS Pivka-TDC SS Pivka, TL 400 kV Cirkovce-Pince (the largest project on 400 kV network in Slovenia), TL 35 kV Jesenice-Kranjska Gora and TL 20 kV Zidani Most (disassembly performed with helicopter support). In terms of substations, ENS is most proud of works done on SS 400/220/110 kV Divača and SS 400/110-220/110 kV Cirkovce with transmission line nodes. Provision of power supply for two factories, one for company Calcit in Gospić, Croatia and the other in town Terneuzen, the Netherlands, are also very important for ENS. Works within the scope of the first factory actually represent the first independent project completed by ENS teams, while works performed in the Netherlands are the first project this Elnos member completed outside Slovenia. Finally, within the top ten favorite endeavors this company was engaged on are assembly works on maintenance of 105 m high telecommunication tower on Beli Križ and vibration measurement on 2×400 kV Beričevo-Okroglo.

Izgradnja 400 kV DV Cirkovce-Pince Construction of 400 kV TL Cirkovce-Pince



## JERNEJ MAJCEN

**Rukovodilac Službe za nadzor ELES-a**  
Head of Construction Supervision at ELES

**SR**, „U veoma dinamičnim proteklim godinama, kada je obim investicionog ciklusa našeg preduzeća bio rekordan, praćen izazovima pandemije i nepredvidivim situacijama na tržištu nabavke sirovina i opreme, imali smo bar nekoliko konstanti. Jedna od njih je pouzdanost i povjerenje u ključne izvodače i montažarske timove, među kojima je svakako i ENS. Uz njihove kadrove, koji odlično poznaju naš sistem i opremu koju koristimo, znamo da će posao koji im povjerimo biti obavljen na vrijeme, kvalitetno, savršeno organizovano i uvijek uz odgovarajuću propisanu dokumentaciju. Drago nam je da imamo takve izvodače u Sloveniji.“

**EN** "Recent years have been very dynamic. Our company had a record scope of investment cycle, which was followed by all pandemic related challenges and unforeseeable market conditions which define procurement of raw material and equipment. However, some elements remained firm and unchanged. One of them is reliability and trust in key contractors and linemen teams. These include ENS. With their staff, who know our system and equipment very well, we are certain that any and all works we assign to them will be completed in a high-quality, timely and perfectly organized manner and will, at all times, be accompanied by proper documentation. We are pleased to have such contractors in Slovenia."

Investicije Investments

# Novi skladišni centar u Švedskoj

A new storage facility in Sweden



**SR** Elnos Nordic ove godine obilježava lijep jubilej – deset godina uspješnog rada i postojanja. U godini svog važnog rođendana naša švedska članica postala je bogatija za novi skladišni centar u Örebru, gradu iz kojeg je moguće stići do bilo koje lokacije u svim nordijskim zemljama u roku od 12 sati.

**EN** This year, Elnos Nordic is celebrating a wonderful jubilee – ten years of successful operation. In the year of this important anniversary, our Swedish member became richer for a new storage facility in Örebro, a city not more than 12 hours' drive away from any location in the Nordic countries.



Privredna komora RS Chamber of Commerce and Industry of Republic of Srpska

## PRIZNANJE ZA DRUŠTVENU ODGOVORNOST

Recognition for social responsibility

**SR** Privredna komora RS nagradila je Elnos BL posebnom nagradom za društvenu odgovornost i održivo poslovanje. Za Elnos BL, ali i cijelu Elnos Grupu, nagrada za doprinos razvoju korporativne društvene odgovornosti je velika podrška i dodatna motivacija za buduće aktivnosti

kroz koje planiramo kreirati ljepšu, zdraviju i odgovorniju budućnost.

**EN** The Chamber of Commerce and Industry of Republic of Srpska acknowledged Elnos BL with a special reward for social responsibility and sustainable business. For

Elnos BL, as well as for the entire Elnos Group, this reward for the contribution to the development of corporate social responsibility represents great support and additional motivation for future steps the company intends to take to create a better, healthier and more responsible future.

Novo priznanje New acknowledgement

## NAGRADA ZA ZAŠTITU NA RADU

Occupational health and safety reward

**SR** Drugu godinu zaredom Elnos BL je ponosni dobitnik posebne nagrade za afirmaciju oblasti zaštite i bezbjednosti na radu. To priznanje je novi vjetar u leđa našem zalaganju u oblasti bezbjednosti i zaštite zdravlja

na radu te je dodatni motiv za postizanje uvijek najviših rezultata u ovoj oblasti.

**EN** For the second year in a row, Elnos BL is proud to receive a reward for affirmation in the domain of occu-

pational health and safety. We think of this acknowledgement as support for all our efforts taken in this area and as an additional motive to strive for the highest results in this aspect.

UNDP BiH UNDP B&amp;H

# LIDERI ODRŽIVOG RAZVOJA

**Leaders in sustainable development**

**SR** Globalna mreža za razvoj Ujedinjenih nacija (UNDP) u BiH nagradila je Elnos Grupu u kategoriji „Resursi i životna sredina“ kao kompaniju koja spada u kategoriju velikih preduzeća koja su lideri održivog razvoja.

Nagrada za biznis lidere održivog razvoja UNDP-a prepoznaje i podržava

angažman kompanija iz privatnog sektora ka najvažnijim ciljevima održivog razvoja u BiH.

**EN** United Nations Global Development Network (UNDP) in B&H, rewarded Elnos Group in the category "Resources and Environment" as one of the large

companies that are leaders in sustainable development. UNDP reward for sustainable development business leaders recognizes and supports the engagement of privately owned companies aiming to achieve the most important goals of sustainable development in B&H.



**Sertifikacija Certification**

## ŠEST ISO STANDARDA

Six ISO standards



**SR** Elnos Grupa ispunjava zahtjeve i unapređuje poslovanje u skladu sa šest međunarodnih standarda: ISO 9001, ISO 14001, ISO 45001, ISO 27001, ISO 50001 i ISO 44001, te sa smjernicama za upravljanje rizicima ISO 31000. Poslovanje Elnos Grupe u skladu je s najboljim svjetskim korporativnim praksama, a kompanija to konstantno potvrđuje sertifikatima koji su usklađeni sa međunarodnim ISO standardima.

**EN** Elnos Group meets the requirements and improves its business in accordance with six international standards: ISO 9001, ISO 14001, ISO 45001, ISO 27001, ISO 50001 and ISO 44001, and risk management guidelines ISO 31000. Elnos Group operates in accordance with the best corporate practices in the world. The company continues proving this true through certifications in accordance with ISO standards.

Novo tržište A new market

## IDEMO U ČEŠKU

**Let's go to Czech Republic**

**SR** Otvaranjem novih tržišta i novih segmenata biznisa Elnos Grupa nastavlja podizati nivo operativnosti i jačati poziciju na evropskom tržištu. Zajedničkim snagama kompanije Elnos Grupa i RRR Consulting otvorele su vrata novog evropskog tržišta – Češke, a naši timovi će prvi projekt u ovoj zemlji realizovati u oblasti rekonstrukcije 400 kV dalekovoda.

**EN** By entering new markets and opening new segments of business, Elnos Group continues raising the level on which the overall business is managed, simultaneously strengthening its position in the European market. Elnos Group and RRR Consulting invested joint efforts into opening the doors to a new European market – Czech Republic. The first project our teams shall be engaged in this country implies a reconstruction of a 400 kV transmission line.



HVDC DOLWIN 5

# ENERGETSKA MREŽA BUDUĆNOSTI

POWER NETWORK OF THE FUTURE

## KAO REMEK-DJELA TEHNOLOGIJE NOVE GENERACIJE, HVDC INTERKONEKCIJE

sve više oblikuju energetske mreže budućnosti. Njihova izgradnja jedan je od najvećih izazova energetske tranzicije.

HVDC interkonekcija DolWin 5, koja će povezati novi offshore vjetropark Borkum Riffgrund 3 na visokonaponsku mrežu na njemačkoj obali, ove godine je naš novi HVDC zadatak.

## AS MASTERPIECES OF NEW GENERATION TECHNOLOGY, HVDC INTERCONNECTIONS

*have an increasingly important role in shaping the power networks of the future. Their construction is one of the greatest challenges of the energy transition.*

*Our new HVDC task of the year is construction of HVDC interconnection DolWin 5 that will connect a new offshore wind park Borkum Riffgrund 3 to the high-voltage network on German shores.*

Nakon učešća u realizaciji dva važna HVDC poduhvata ovog ljeta zakoračili smo i u treći HVDC poduhvat – DolWin 5, interkonekciju koja će imati kapacitet 900 MW i biti dugačka 130 kilometara.

Fokus naših radova je na konvertorskoj stanicici Emden, u Njemačkoj, instalirane snage 900 MW i naponskog nivoa +/- 320 kV DC, u kojoj kao podizvođač kompanije Hitachi Energy realizujemo kompletne elektromontažne radove.

Između ove konvertorske stanice i offshore vjetroparka Borkum Riffgrund 3 gradi se interkonekcija DolWin 5.

Ovo je prvi put da realizujemo radne zadatke na konvertorskoj stanciji na izuzetno zahtjevnom njemačkom tržištu. Oprema koja se ugrađuje u ove stанице, u odnosu na konvencionalne AC stанице, dosta je gabaritnija te mnogo složenija i osjetljivija. Učešće u izgradnji još jedne energetske mreže za nove generacije donijelo



nam je brojne izazove. Takvi projekti zahtjevaju drugačiji način planiranja, izvođenja i praćenja radova.

„Bilo je potrebno nekoliko mjeseci za ogroman posao pripreme projektne dokumentacije, koja je bila izuzetno sveobuhvatna. Paralelno s tim tekla je velika logistička akcija, ali i akcija nabavke nove važne opreme za ovaj projekat. Zaista smo maksimalno spremni ušli u ovaj posao i sa velikom željom da nadogradimo naše



HVDC Dolwin 5 – naš novi HVDC izazov HVDC Dolwin 5 – our new HVDC challenge

ranije znanje i iskustvo“, kaže Milenko Jajčanin, inženjer Elnos Grupe i rukovodilac gradilišta na ovom projektu.

Naš dio poslova na izgradnji konvertorske stanice obuhvatao je elektromontažne radove koji se odnose na montažu cjelokupne opreme potrebne za njen rad, ormara zaštite i upravljanja, kablovskih kanalica, zatim sistema za nadzor i upravljanje. Radovi obuhvataju i polaganje i povezivanje SN i NN kablova, mjernih i upravljačko-

-signalnih kablova, testiranje opreme i djelomičnu podršku prilikom puštanja u rad.

„Počeli smo izvođenje radova u oktobru 2022. godine. Lokacija konvertorske stanice je na sjeveru Njemačke, u regiji Donja Saksonija, i radi se o izrazito kišnom području, na kojem duvaju snažni vjetrovi, što nikako nisu okolnosti koje vam mogu olakšati rad. Zahtjevi u pogledu zaštite na radu i zaštite životne sredine su na vrlo visokom nivou.

## NAŠE HVDC ISKUSTVO

HVDC tehnologije energetskim tržištima daju prijeko potrebnu fleksibilnost, koja je ključna za rješavanje problema sve veće potražnje za energijom. Uz znatno manje gubitke prenosa velike količine energije na velikim udaljenostima, one postaju globalno energetsko rješenje. Graditi HVDC interkonekcije jedan je od najvećih izazova ovog dinamičnog trenda. Naši timovi do sada su bili dio izgradnje dva velika evropska HVDC sistema: interkonekcije MONITA – energetskog mosta između Crne Gore i Italije i NordLink – najveće evropske HVDC interkonekcije između Njemačke i Norveške.

Radovi se izvode disciplinovano i izuzetno profesionalno, a dnevna radna dinamika je jako dobra“, rekao je Jajčanin.

## ISPOD NIVOA MORA

Mjesto na kojem se gradi konvertorska stanica nalazi se ispod nivoa mora, na lokaciji koja je ranije u bici stanovnika sa neumoljivom vodenom površinom velikim nasipom odvojena od obale Sjevernog mora.

Gradilište je ogromno i prostire se na površini od 20.000 m<sup>2</sup>. Na njemu u prosjeku dnevno radi 100 radnika, a među njima tim Elnosa broji 30 ljudi.

## MODERNE TEHNOLOGIJE

I na trećem HVDC projektu naš tim je izuzetno motivisan, jer radi na nečemu novom. Ekipa je fascinirana tehnikom koja je potpuno drugačija od standardnih stanica. U ovim sistemima koriste se elektronske komponente za vrlo visoke napone. Radimo na isti način kao i u Norveškoj i Crnoj Gori tako da sada pravimo novi značajan korak da dokažemo svoju spremnost i sposobnost da odgovorimo na izazove koje postavlja izgradnja HVDC interkonekcija.

„Iako smo se sa HVDC tehnologijama sretali ranije, one su, naravno, i ovaj put veliki izazov. Istakao bih da je ovo projekat u kojem se u konvertorskoj stanici prvi put koristi verzija pretvaračkih modula pete generacije, koja se montira posebnim, namjenski proizvedenim alatom. Za potrebe ovog projekta nabavili smo i vlastitu mašinu za punjenje aparata SF6 gasom, kao i analizator kvaliteta SF6 gasa. Naime, da bi visokonaponski prekidači radili funkcionalno, oni u sebi imaju SF6 gas. Usljed mogućih oštećenja tokom transporta,



U službi energije vjetra In the service of wind power

### TIPIČAN RADNI DAN

Svaki dan je nova mala radna misija koja počinje u ranim jutarnjim časovima za vrijeme raspoređivanja dnevnih zadataka. Nakon toga počinju radovi, a gradilište izgleda poput džinovske košnice. Samo za vrijeme podnevne pauze za ručak sve utihne na jedan sat, a onda se svako vraća svojim zadacima sve do završetka radova, oko 17 časova.

### NJEMAČKA – ZELENA ENERGETSKA SILA

Cilj energetske politike Njemačke je dosegnuti 65 odsto napajanja iz obnovljivih izvora do 2030. godine. Brzorastući trend svoje čiste energetske priče u sve većoj mjeri ova zemlja dobija kroz snažnu izgradnju offshore vjetroparkova u priobalnom području Sjevernog mora. Za samo deset godina, proizvodnja energije iz vjetra na moru porasla je sa nula na 6.382 MW, što je čini drugim po veličini proizvođačem ovog vida zelene energije u svijetu.

VN prekidači nam se dostavljaju bez gasa, a kada se montiraju, mi ih uz naše nove mašine punimo SF6 gasom", rekao je Jajčanin.

### EVROPSKI TIM ZA HVDC PROJEKTE

DolWin 5 je veliki korak naprijed u razvoju integrisanog evropskog energetskog tržišta. Ovom interkonekcijom će se prenositi električna energija u velikom kapacitetu od 900 MW, sa nultom emisijom ugljenika, što je dovoljno za napajanje oko milion domaćinstava. Naš dio radova na gradilištu aktivno će trajati do jula 2023. Ponišni smo na realizaciju projekta na izuzetno visokom tehničkom nivou, a posebno smo ponosni na to što naši zaposleni postaju evropski tim za HVDC projekte.

**EN** After completion of works on two important HVDC projects, this summer we dived into our third endeavor of this type – construction of DolWin 5, a 130 km long HVDC interconnection with a future capacity of 900 MW. The focus of our works rests on a converter station Emden in Germany, with 900 MW of installed power and +/- 320 kV DC voltage level. As a subcontractor of the company Hitachi Energy, we are performing overall electrical assembly works. It is precisely between this converter station and offshore wind park Borkum Riffgrund 3 that the DolWin 5 interconnection is being built.

This is the first time we are performing works on a converter station in Germany, a country known for its highly demanding market. The equipment being installed in these stations is significantly larger and much more complex and sensitive compared to the equipment used in conventional AC stations. However, new challenges are imminent when you

participate in construction of one more power network for a new generation. Such projects require a different approach to planning, execution and monitoring of works.

"It took us several months to prepare the design documentation. This was an astonishingly extensive task. Yet, a large-scale logistics operation was running simultaneously with the design process, together with the procurement of new equipment for this project. We really prepared ourselves well for this project and were eager to further expand our previously gained experience and knowledge", said Milenko Jajčanin, Elnos Group Engineer and Site Manager on this project.

Our part of works on construction of this converter station is to perform overall electrical assembly works that include installation of all equipment necessary for its operation, protection and control cabinets, cable trays and control and monitoring system. The works also include laying and connection of MV and LV cables, measurement cables and control and signal cables as well as equipment testing and partial support during commissioning.

"Our works commenced in October 2022. The converter station is located in Lower

Naš tim za HVDC projekte Our team for HVDC projects



Saxony, a region in the northern part of Germany. This part of the country is known for its rainy weather and strong winds. Such circumstances can in no way make your job any easier. Also, occupational health and safety and environmental requirements are set quite high. Works are being executed professionally and with the highest level of discipline, all in line with the daily time schedule", said Jajčanin.

## BELOW SEA LEVEL

The converter station is being built on a location below sea level. This part of soil had been won by its residents in a relentless battle fought with the North Sea. A large embankment had been constructed to separate the land from the shore.

The construction site is enormous. It spreads over an area of 20.000 m<sup>2</sup>. Approximately 100 people work on this site every day, 30 of which belong to Elnos teams.

## MODERN TECHNOLOGIES

Our teams are exceptionally motivated, despite the fact that this is the third HVDC project for our company. This is mainly because this project offers something new.



## GERMANY – A GREEN ENERGY FORCE

The aim of the German energy policy is to get 65 percent of energy from renewable sources until the year 2030. The fast-growing clean energy trend in this country is mainly based on an ever-increasing number of offshore wind parks being constructed on the North Sea area. In only ten years, the production of energy from wind power in the sea increased from zero to 6.382 MW. This makes Germany the world's second largest producer of this type of energy.

The teams are most fascinated by the technology which is completely different compared to typical stations. These systems imply use of electronic components for extremely high voltage levels. We took the same approach to the works as in Norway and Montenegro and we are happy to be able to prove our readiness and ability to meet new challenges posed by HVDC interconnection construction projects.

"Although we have experience with HVDC technologies, they still remain a big challenge. I would like to emphasize that this project implies use of converter modules of the fifth generation which have to be installed using custom-made tools. To meet the needs of this project we procured a machine to supply the device with SF6 gas as well as an SF6 gas quality analyzer. Namely, in order to be functional, high-voltage switches must have SF6 gas in them. With the aim to avoid potential damage during transport, HV switches are being delivered to us without the gas. Once they are installed we use our new machines to fill them with SF6 gas", said Jajčanin.

## A EUROPEAN TEAM FOR HVDC PROJECTS

DolWin 5 is an important step forward in development of an integrated European energy market. This interconnection will transmit electrical power in a capacity of 900 MW, with zero carbon transmission, which is enough energy to supply approximately one million households. The works we are performing will last until June 2023. We are proud of the fact that the project is being executed on a very high technical level and that our employees are becoming a European team for HVDC projects.

## A TYPICAL DAY AT WORK

Every day is a new mission that starts in the early morning when daily tasks are assigned. Then, the works commence and the construction site starts looking like a giant beehive. It is only during the midday break when everything is still for an hour. When the break is finished, everybody returns to their work until the end of the work day at about 17 h.

Svaki dan je nova radna misija Every working day is a new mission



## OUR HVDC EXPERIENCE

HVDC technologies offer indispensable flexibility to the energy markets, which represents a key answer to the problem of constantly increasing demand for electrical power. These technologies significantly minimize losses during long-distance transmission and are thus becoming a global power solution.

Constructing an HVDC interconnection is one of the greatest challenges of this dynamic trend. So far, our teams have been a part of two big European HVDC projects: MONITA interconnection – a power bridge between Montenegro and Italy and NordLink – the greatest European HVDC interconnection between Germany and Norway.

# U susret izazovima zelene Švedske

## Meeting the challenges of green Sweden



Izgradnja TS 400 kV Hageskruv Construction of SS 400 kV Hageskruv

„SWEDEN FOR REAL“ zvanični je slogan švedskog regiona Småland na jugu ove zemlje. Sa bogatom kulturom, netaknutom prirodom i rodnim mjestom koncerna IKEA, ova regija je Švedska u svoj svojoj suštini.

Upravo u njoj naši timovi grade 400 kV trafostanicu Hageskruv, novi važan link za buduće povezivanje novih vjetroparkova ove regije na 400 kV elektroenergetsku mrežu.

“SWEDEN FOR REAL” is the official slogan of Småland, a region in South Sweden. With its rich culture and intact nature, Småland, the birthplace of IKEA, is the very essence of everything that Sweden is. Precisely in this region, our teams are constructing a 400 kV substation Hageskruv, a new important connection between future wind parks of this region and 400 kV electrical power network.

### SR NOVI LINK U SLUŽBI ZELENE ENERGIJE

Zvanična OIE politika Švedske ambiciozno teži ka jednom cilju – stvarstvo napajanje iz obnovljivih izvora do 2045. godine. U svojoj težnji ka njegovom ispunjenju, u oblasti Småland, na jugu ove zemlje, niče sve veći broj vjetroparkova. Sve više energije koja dolazi iz vjetra postavlja sve veće zahtjeve za nove kapacitete pred elektroenergetsku mrežu. Nova 400 kV trafostanica Hageskruv biće jedno od važnih čvorišta posredstvom kojeg će se energija iz novih vjetroparkova ove regije isporučivati u 400 kV elektroenergetsku mrežu.

## NAŠI RADOVI

Izgradnja nove trafostanice je kompleksan posao, a ekipama naše kompanije u okviru ovog projekta povjereni su kompletni elektromontažni radovi na 400 kV i 130 kV rasklopnim postrojenjima.

U maju su počeli radovi na 400 kV rasklopnom postrojenju, koje se sastoji od dva dalekovodna i jednog trafo polja sa dvostrukim sistemom sabirница. Radove u ovom postojenju smo realizovali za kompaniju Svenska kraftnät, a zajedno sa timom kompanije Omexom Sverige.

Dinamika radnih zadataka u septembru se usmjerila i na 130 kV rasklopno postrojenje, koje se sastoji od jednog dalekovodnog, jednog transformatorskog i polja za kompenzaciju reaktivne energije sa jednim sistemom sabirnica.

Sveobuhvatni elektromontažni radovi koji su povjereni Elnos Grupi obuhvataju montažu VN aparata, izgradnju primarnih veza i izradu uzmajljenja.

Zaduženi smo i za montažu čelične konstrukcije, montažu ormara zaštite i upravljanja, zatim instalaciju kompletног AC i DC podrazvoda, kao i sekundarno povezivanje. Pored toga, naš tim radi kompletne elektroinstalacija opšte potrošnje unutar kontrolnih zgrada.

Projektni zadaci na 400 kV i 130 kV postrojenjima teku u skladu sa ranije usaglašenom dinamikom i njihov najveći dio biće završen do kraja ove godine.

## MJERE SIGURNOSTI I DOBRA KOMUNIKACIJA

Izgradnja trafostanice Hageskruv realizuje se uz poštovanje najvećih mjera sigurnosti u oblastima zaštite na radu i životne sredine, ali i na polju zaštite podataka.

„Ovo je projekt u okviru kojeg poštujemo veoma striktnе ekološke propise kako bi se maksimalno očuvala životna sredina ove živopisne regije te smanjila svaka mogućnost zagadenja vode, vazduha i zemljišta“, rekao je Radovan Spasojević, inženjer Elnos Grupe.

On je istakao i to da je Elnos Grupi povjeren značajan i kompleksan obuhvat zadataka, za dva investitora i tri glavna podugovarača, što je još jedna od potvrda velikog povjerenja koje uživamo u ovoj zemlji.

Dobra komunikacija izuzetno je važna za uspješnu realizaciju svakog projekta.

„Komunikacija između naših site-manadžera i investitora, partnera i supervizora na visokom je nivou. Pored kvalitetno urađenog posla, ona je ključna za sticanje povjerenja između timova, dobro obavljanje radnih zadataka i na kraju za postizanje dobrih rezultata“, rekao je Spasojević.

## NA RASPLETU DALEKOVOUDA

Veliki obuhvat radova slijedi u aprilu i maju naredne godine. Tada će tim Divizije za dalekovode Elnos Grupe, biti angažovan na kompleksnim poslovima izgradnje raspleta 400 kV dalekovoda, koji će biti priključen na 400 kV rasklopno postrojenje u trafostanici Hageskruv, te instalirati OPGW na 70 kilometara nove dalekovodne trase. Investitor ovog dijela projekta je kompanija Svenska kraftnät.

## EN NEW LINK IN SERVICE OF GREEN ENERGY

Swedish official RES policies have set an ambitious goal – to get hundred percent of energy from renewable sources by the year 2045. Numerous wind parks are being constructed in region Småland in the south of Sweden, as a part of a tendency to fulfill this goal. However, more energy from wind power also implies the need to increase capacity of electrical power network. Thus, a new 400 kV substation Hageskruv is to become one of most important nodes for delivery of electrical energy from the new wind parks to 400 kV electrical power network.

## WHAT WE DO

Constructing a new substation is a complex task. Within this project, our teams have been entrusted with overall electrical assembly works on 400 kV and 130 kV switchyards.

Works on the 400 kV switchyard started in May. The switchyard is composed of two line bays and one transformed bay with a double busbar system. In line with time schedule, works on the 130 kV switchyard came into focus in September. This switchyard includes one line bay, one transformer bay and one reactive power compensation bay with single busbar system. We finished the works in this plant for the company Svenska kraftnät, together with the team of the Omexom Sverige company.

Total electrical assembly works assigned to Elnos Group imply assembly of HV devices, primary links and grounding.

We have also been given a task to assemble and erect the steel structure, a network of protection and control cabinets, overall AC and DC sub-distribution and secondary links. Moreover, our teams are performing electrical assembly works for general consumption within control buildings.

Project assignments on 400 kV and 130 kV plants are being completed in accordance with previously defined time schedule and will,

to a great extent, be completed up to the end of the current year.

## SAFETY MEASURES AND A GOOD COMMUNICATION

Construction of substation Hageskruv is being implemented in compliance with the strictest possible safety measures concerning occupational health and safety, environmental protection, and data protection.

“Working on this project implies acting in accordance with very strict environmental regulations, so as to preserve the environment of this vivid region as much as possible, and reduce any possibility of water, air or soil pollution”, said Radovan Spasojević, Elnos Group Engineer.

He also pointed out that Elnos Group has been entrusted with a scope of exceptionally important and highly complex works, on a project with two Investors and three Main Contractors, which serves as another confirmation of the great trust our company is enjoying in this country.

Good communication is extremely important for successful completion of this project.

“Communication between our Site Managers and Investors, Partners and Supervisors is on a high level. Apart from the work well done, communication is crucial for building trust between the teams, for performing tasks on daily basis and, finally, for achieving good results”, said Spasojević.

## ON A TRANSMISSION LINES JUNCTION

Works will become intensified next year in May and April. At that time, Transmission Line Division team will be performing very complicated works on construction of a 400 kV transmission line junction, which will be connected to a 400 kV switchyard in substation Hageskruv. They will also be laying OPGW on 70 kilometers of a new transmission line route. The investor of this project part is the company Svenska kraftnät.

Ekipa na djelu Teams in actions



# NOVA ENERGIJA ZA CRNU GORU

POWERING MONTENEGRO

**ŠTA TO POVEZUJE TRI VELIKE TRAFOSTANICE, DVA GRADA U CRNOJ GORI I VRELO LJETO 2022?** Tačan odgovor na ovo pitanje je finale projekta izgradnje Transbalkanskog energetskog koridora kroz Crnu Goru. Finiš ove maratonske energetske misije donio je modernizaciju tri najveća energetska čvorišta zemlje, a to su trafostanice 220/110/35 kV Podgorica 1, 400/110 kV Podgorica 2 i 400/220/110 kV Pljevlja 2.

**WHAT IS IT THAT CONNECTS THREE BIG SUBSTATIONS, TWO CITIES AND HOT SUMMER OF 2022?** Correct answer to this question is completion of construction of Trans-Balkan Electricity Corridor through Montenegro. Finish of this marathon mission in electrical engineering resulted in modernization of three major power nodes in the country, namely 220/110/35 kV Podgorica 1, 400/110 kV Podgorica 2 and 400/220/110 kV Pljevlja 2.

## SR VELIKO FINALE

Rekonstrukcija ove tri trafostanice bila je izuzetno dinamičan i složen posao. Njihova snaga i veličina, zatim naponski nivoi, broj bitnih izvoda koji izlaze iz trafostanica – sve su to bili faktori koji su uticali na kompleksnost ovog zadatka. Uloga ove tri trafostanice u funkcionisanju crnogorskog elektroenergetskog sistema je enormna, što je ekipi Elnos Grupe stavilo pred veliki test umještosti i izdržljivosti. Naši ljudi su u ovoj fazi radova pobijedili izrazito teške vremenske uslove i to u širokom rasponu od surovih pljevaljskih zima do nesnosnih vrelina u Podgorici. Timovima Elnos Grupe bio je povjeren posao: zamjene visokonaponske opreme, rekonstrukcije sistema relejne zaštite i upravljanja, rekonstrukcije sistema sopstvene potrošnje te integracije SCADA sistema.

„Svaka od ovih trafostanica je veoma specifično postrojenje za sebe. Tako, na primjer, u Pljevljima termoelektrana direktno plasira energiju u trafostanicu Pljevlja 2. U trafostanici Podgorica 2 nalazi se najznačajniji rasplet 110 kV dalekovoda sa transformacijom 400/110 kV, a trafostanica Podgorica 1 je 220 kV i 110 kV čvorište sa 35 kV izvodima koji napajaju glavni grad zemlje“, rekao je Goran Đurasović, projekt menadžer Elnos Grupe.

## SLOŽENOST I ISKLJUČENJA

Kompleksnost, to bi moglo biti drugo ime ovog velikog projekta. Kompletan poduhvat rekonstrukcije svih 15 trafostanica širom Crne Gore bio je izuzetno veliki izazov, a jedan od najvećih bio je, pored teškoća uklapanja novih sistema u stara postrojenja, rad u striktno definisanim fazama isključenja dijelova elektroodistributivne mreže.

Ekipi su morale raditi u strogo definisanim terminima isključenja elektroodistributivne mreže. Ovo je u praktičnom smislu značilo da su uporedo izvodile radove u više trafostanica. Režim rada u kojem je dio postrojenja pod naponom i u pogonu za vrijeme izvođenja radnih zadataka znatno povećava stepen opasnosti po ljudske živote.

„Uprkos svim zadacima koji su ovaj poduhvat činili kompleksnim, sve povjerenje nam poslove uspješno smo završili. Svi članovi ekipa koji su bili angažovani na terenu pokazali su da su sjajni profesionalci. Zahvaljujući njima, danas smo na kraju misije koje će se svako od nas sjećati“, rekao je Đurasović.

## BENEFITI PROJEKTA

Realizacija ovog projekta donosi sigurniji i pouzdaniji rad postrojenja, odnosno smanjenje neplaniranih prekida u napajanju. Dodatno, nova visokonaponska oprema znači produženje vijeka trajanja glavnih elemenata prenosne mreže, odnosno smanjenje troškova održavanja.

## PROJEKAT ENERGETSKE BUDUĆNOSTI REGIJE

Rekonstrukcija 15 trafostanica u Crnoj Gori dio je veće inicijative iz Agende povezivanja – Transbalkanskog koridora, koji će 400 kV dalekovodnom linijom povezati Rumuniju, Srbiju, Bosnu i Hercegovinu i Crnu Goru, dok će posredstvom HVDC interkonekcije MONITA ove zemlje biti energetski povezane sa Italijom.



Rekonstrukcija TS 400/110 kV Podgorica 2 Reconstruction of SS 400/110 kV Podgorica 2

## **EN GRAND FINALE**

Reconstruction of these three substations was an extremely dynamic and complicated endeavor. Their size and power, voltage levels and number of important connections from the substations- all of these factors contributed to high complexity of this project. The role these three substations have in general functioning of electrical power system in Montenegro is enormous. Hence, this project was a skill and endurance test for Elnos Group teams. During its realization, our teams had to handle and endure extreme weather conditions ranging from rough winters in Pljevlja to unbearable heat in Podgorica.

Elnos Group teams were entrusted with the task to perform following works: replacement of high-voltage equipment, reconstruction of control and relay protection system, reconstruction of system for own consumption and integration of SCADA system.

“Each of these substations is a very specific facility. For example, in Pljevlja, thermal power plant distributes power directly to substation Pljevlja 2. Substation Podgorica 2 is the home of the most significant transmission line node with 400/110 kV transformation, while

substation Podgorica 1 represents a 220 kV and 110 kV node with 35 kV outputs which supply country’s capital”, said Goran Đurasović, Project Manager at Elnos Group.

## **COMPLEXITY AND OUTAGES**

Complexity might as well have been middle name of this project. Entire endeavor to reconstruct 15 substations throughout Montenegro was exceptionally challenging. It was difficult to integrate new systems in old facilities, but what presented an even greater challenge was to perform these works within strictly defined planned outages of entire segments of power distribution network.

Teams had to work within these fix periods of power outages. This means that works were conducted in several substations simultaneously. Work regime which implies that a part of the facility is energized and operating while works are being executed significantly raises the level of danger for human lives.

“Despite all the circumstances that made this venture perplexed, we successfully finished all the works assigned to us. All team members engaged on site demonstrated a remarkably high level of professionalism.

Thanks to them, we are now at the end of a mission all of us will most certainly never forget”, said Đurasović.

## **PROJECT BENEFITS**

Completion of this project results in safer and more reliable every day operation of the facility i.e. reduction in number and duration of unplanned outages. Moreover, new high-voltage equipment extends lifetime of main elements of transmission network, which again leads to decrease of maintenance expenses.

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## **A PROJECT FOR FUTURE OF ENERGY IN THE REGION**

Reconstruction of 15 substations in Montenegro is a part of a wider Connectivity Agenda initiative to construct a Trans-Balkan Electricity Corridor, which will connect Romania, Serbia, Bosnia and Herzegovina and Montenegro with 400 kV transmission line, and HDVC interconnection MONITA to connect these countries with Italy.

# DUPLO SNAŽNIJA

## IT'S TWICE AS STRONG

### GOTOVO 40 GODINA 220/110 KV TRAFOSTANICA KRALJEVO 3

u Dragosincima bila je najvažniji objekat za napajanje i Kraljeva i Kruševca. Za vrijeme svog dugog radnog vijeka ova trafostanica zabilježila je impresivne rezultate. Ovog ljeta uspješno je završena njena velika rekonstrukcija, kojom joj je snaga gotovo udupljana.

### FOR ALMOST 40 YEARS, 220/110 kV SUBSTATION

**KRALJEVO 3** in Dragosinci has been the most important facility for supplying Kraljevo and Kruševac with electrical power. During its long lifetime, this substation achieved some impressive results. This summer, reconstruction of the substation was finally completed and power of the facility was nearly doubled.



**SR** Trafostanica Kraljevo 3 nalazi se na jednom kraju novog 400 kV dalekovoda od Kragujevca do Kraljeva. Njena rekonstrukcija i nadogradnja dio je velikog poduhvata izgradnje Transbalkanskog energetskog koridora kroz Srbiju. Po završetku ovog projekta, TS Kraljevo 3 postala je prva 400/220/110 kV trafostanica u zapadnoj Srbiji.

Timovi Elnos Srbije u okviru izgradnje i nadogradnje trafostanice Kraljevo 3 realizovali su elektromontažne radeve u 400 i 220 kV poljima te izveli kompleksnu montažu 400 kV transformatora, što je bila svojevrsna kruna njihovog rada u okviru ovog projekta.

Naime, u trafostanici Kraljevo 3 dogradeno je cijelo 400 kV postrojenje. Naponski nivo ove trafostanice, koji je do sada bio 220/110 kV, nakon rekonstrukcije i nadogradnje povećan je na 400/220/110 kV. Našim timovima povjereni su radovi na montaži poprečnih i primarnih veza i sabirnica u 400 kV i 220 kV polju, zatim dio montaže VN opreme te nabavka opreme za telekomunikacione mreže u TS Kraljevo 3.

Rekonstrukcija ove trafostanice bila je sve osim običnog zadatka. Za uspjeh ove misije bila je potrebna posebna kombinacija znanja i umijeća, koje su naše ekipe posebno iskazale za vrijeme montaže velikog transformatora...

## ZADATAK TEŽAK 270 TONA

Većina ekipa Elnos Grupe angažovanih na ovom projektu pamtiće ga po montaži 400/220 kV transformatora (400 MVA) teškog nevjerovatnih 270 tona. Veliki transformator je prije deset godina montiran na privremenu lokaciju u blizini trafostanice Kraljevo 3, ali nikada nije pušten u funkciju.

Vrijeme njegovog čekanja na početak rada odzvnilo je sa startom rekonstrukcije trafostanice Kraljevo 3. Svi su znali da se sa ovim 270 tona teškim divom neće biti lako izboriti. Ali pitanje na koje нико nije imao jednostavan odgovor je bilo – kako to uraditi?

Bio je ovo najkompleksniji dio zadatka povjerenog timovima naše kompanije u okviru rekonstrukcije trafostanice 400/220/110 kV Kraljevo 3. Ovo je najveći transformator u Srbiji, a njegova demontaža i montaža bile su pravi podvig preciznosti, posvećenosti i tačnosti. Formula za ovaj posao znali su samo naši timovi sa terena.

Uspješnom montažom transformatora opravdali smo veliko povjerenje investitora Elektromreže Srbije, koja je prvi put ovakav posao povjerila ekipama koje nisu dio njene firme.

„Početak rada trafostanice Kraljevo 3 ujedno je početak novog doba stabilnih i boljih naponskih prilika u regiji zapadne Srbije. Kraj njene

rekonstrukcije je ujedno završetak druge sekcije izgradnje Transbalkanskog koridora kroz Srbiju“, rekao je Mladen Miletić, rukovodilac Divizije za trafostanice u Elnosu Srbija.

## JEDAN PODUHVAT, TRI ZADATKA

Izgradnja Transbalkanskog energetskog koridora kroz Srbiju je poduhvat od strateškog značaja. Timovi Elnos Grupe su kao dio konzorcijuma bili važna karika cjelokupnog poduhvata realizacije druge sekcije Transbalkanskog energetskog koridora kroz Srbiju. Ona se sastojala od tri važna segmenta: rekonstrukcije i nadogradnje trafostanice Kraljevo 3, zatim nadogradnje trafostanice Kragujevac 2 i izgradnje novog 400 kV dalekovoda između ova dva elektroenergetska objekta.

**EN** Substation Kraljevo 3 is located at one end of new 400 kV transmission line connecting Kraljevo and Kragujevac. Reconstruction of this substation and its upgrade are a part of construction of Trans-Balkan Electricity Corridor through Serbia. Upon completion of this project, SS Kraljevo 3 became first 400/220/110 kV substation in West Serbia.

Within construction and upgrade of substation Kraljevo 3, Elnos Serbia teams completed electrical assembly works in 400 and 220 kV bays and, as a crown of their work on this project, finalized a highly complex assembly of a 400 kV transformer.

Namely, an entire 400 kV facility was constructed in substation Kraljevo 3. Before reconstruction and upgrade, voltage level of this substation was 220/110 kV. Following the works done by our teams, voltage level of the substation increased to 400/220/110 kV. Elnos Group teams were assigned with assembly of primary and lateral connections and busbars in 400 kV and 220 kV bays, assembly of a part of high-voltage equipment and procurement of equipment for telecommunication network in SS Kraljevo 3.

Reconstruction of this substation was everything but a common task. A combination of very specific knowledge and skills was essential for successful completion of this mission and our teams demonstrated they possessed the qualities requested, particularly during assembly of the big transformer...

## 270 TONS – A HEAVYWEIGHT ASSIGNMENT

Majority of Elnos Group teams engaged on this project will remember it by assembly of 400/220 kV transformer (400 MVA) that weighs incredible 270 tons. The big transformer was

assembled on its temporary location in proximity of substation Kraljevo 3 ten years ago, but was never commissioned.

When reconstruction of substation Kraljevo 3 started, it was clear that the big transformer will wait no more. Everybody knew that this 270 ton giant will not be easy to handle but nobody knew how to handle it exactly. A simple answer was nowhere to be found.

Finding the answer to this question and implementing it was the most difficult part of the assignment given to our company within reconstruction of 400/220/110 kV substation Kraljevo 3. This is the largest transformer in Serbia. Its disassembly and reassembly required nothing less than a wonder in terms of precision, dedication and accuracy. And only our teams knew the formula.

By assembling the transformer successfully, we justified the trust the investor Elektromreže Srbije gave us, when they outsourced such an assignment for the first time in their history.

“Commissioning of substation Kraljevo 3 is also a start of a new era of better and more stable power supply in West Serbia. End of this reconstruction marks, at the same time, completion of second section of Trans-Balkan Electricity Corridor through Serbia“, said Mladen Miletić, Head of Substation Division at Elnos Serbia.

## ONE VENTURE, THREE ASSIGNMENTS

Construction of Trans-Balkan Electricity Corridor through Serbia is a venture of strategic importance. As a part of a consortium, Elnos Group teams were a backbone of construction of its second section, which comprised of three important segments: reconstruction and upgrade of substation Kraljevo 3, upgrade of substation Kragujevac 2 and construction of new 400 kV transmission line between these two power facilities.

TS 400/220/110 kV Kraljevo 3 SS 400/220/110 kV Kraljevo 3





Radovi unutar zidina poznate Stare elektrane Works within the walls of well-known power plant Stara

**U GRADU ZMAJEVA** IN THE CITY OF DRAGONS

# UMJETNOST TRANSFORMACIJE

THE ART OF TRANSFORMATION

**IVO MOŽE ZVUČATI KAO UVOD  
U VRLO RIZIČAN SCENARIO –**  
rekonstrukcija trafostanice u 124 godine staroj elektrani koja je danas poznati slovenački centar za savremenu scensku umjetnost. Ipak, nije tako. Korak po korak, rješavanje ovog zadatka postalo je mala-velika misija koja će služiti na pohvalu slovenačkoj prijestonici, ali i timovima ENS-a koji su na njoj predano radili.

**THIS MIGHT SOUND AS AN  
INTRODUCTION OF A HIGH RISK-  
SCENARIO – reconstruction of a substation  
in 124 years old power plant in Slovenia,  
today's renown center for contemporary  
performing arts. But that is not the  
intention. By taking a step-by-step approach,  
completion of this task came to be a  
praiseworthy endeavor, small in size yet huge  
in its importance, of the capital of Slovenia  
and ENS teams and their diligent work.**

**SR** Zgrada u kojoj se nalazi elektrana je u srcu Ljubljane i datira još iz davne 1898. godine. U okviru njenog impresivnog i autentičnog kompleksa, koji je svoju industrijsku ulogu zamijenio kulturnom, na samo nekoliko desetina metara udaljenosti od pozorišne scene, već godinama uspješno radi 110/20 kV trafostanica Center. Ova trafostanica napaja jezgro prijestonice Slovenije.

Ovo ljeto donijelo je vrijeme za promjene. Iza zidina poznate Stare elektrane, paralelno sa novim predstavama, počeli su se odvijati prvi radovi rekonstrukcije 110/20 kV trafostanice Center.

## TRANSFORMACIJA UZ INOVACIJU

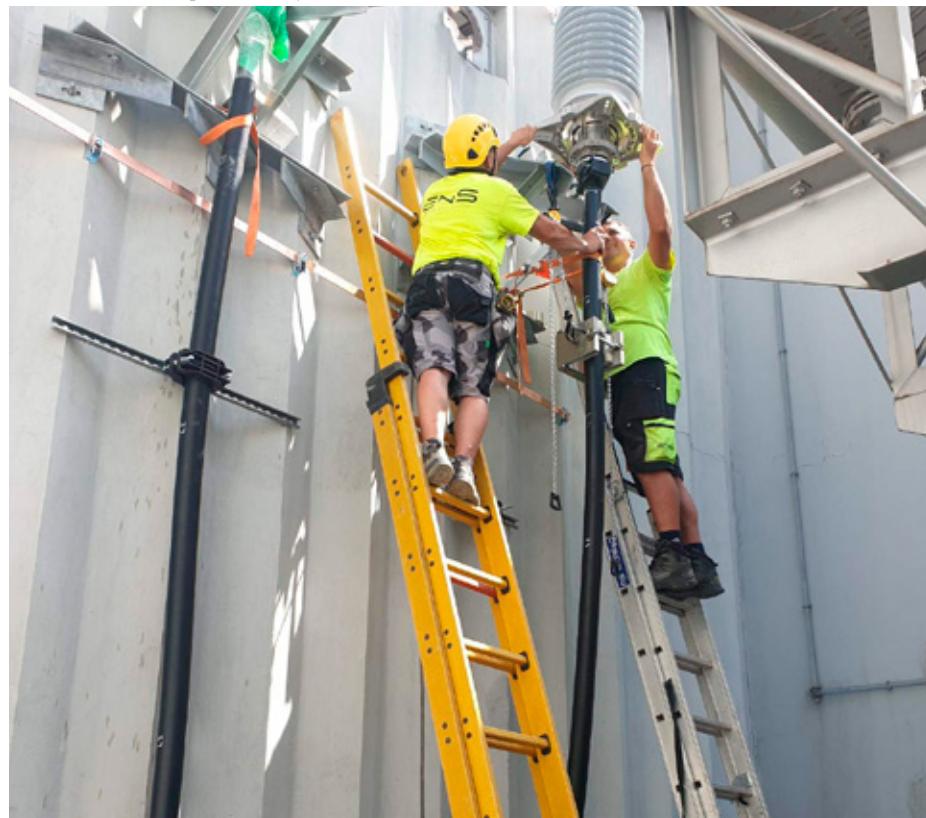
O rekonstrukciji trafostanice Center počelo se razmišljati u trenutku kada je njeno održavanje postalo prezahtjevno i kada su energetske potrebe slovenačke prijestonice počele da traže viši stepen sigurnosti napajanja. Rješenje se nametnulo samo – trafostanica Center proći će kroz kompleksnu rekonstrukciju, kroz čiji postupak će u potpunosti biti modernizovana i postati nova trafostanica sa GIS visokonaponskim 110/10 (20) kV postrojenjem.

Kompletna zgrada objekta trafostanice, osim vanjskih zidova prema ulici, se ruši, a gradi se nova zgrada, u kojoj će biti novo, moderno visokonaponsko GIS postrojenje i SN postrojenje. Radovi rekonstrukcije će se odvijati u pet visokonaponskih polja: mjernom, spojnom, vodnom i u dva transformatorska polja.

Ovo je projekat u okviru kojeg je ENS, kao član konzorcijuma, odgovoran za: građevinske radove, postavljanje mašinskih i elektro instalacija, instalaciju uzemljenja, demontažu i montažu SN i VN opreme, montažne radove na SN opremi za vlastitu potrošnju te montažu VN kablovskih glava.

„Raditi u objektu koji je pod visokim stepenom zaštite kulturne baštine zahtjeva efikasan i delikatan pristup. Samim tim rekonstrukcija ove trafostanice traži iskusan i profesionalan tim koji može da odgovori najvišim izazovima ovog projekta“, rekao je Bojan Gale, inženjer ENS-a.

Zadatak za iskusan tim Assignment for an experienced team



Za vrijeme izvođenja određenih etapa radova stara trafostanica će biti pod naponom, što je posebno zahtjevna faza kada mјere bezbjednosti moraju biti na najvišem nivou. U tom periodu će zaštitne i upravljačke funkcije biti privremeno prebaćene na 110/20 kV trafostanicu Žale.

Radovi rekonstrukcije izvode se u vrlo ograničenom prostoru. To je posebno kompleksna i delikatna kategorija radova. Projektom je jasno definisano da je bilo kakvo oštećenje zgrade Stare elektrane za vrijeme izvođenja radova nedopustivo. Ekipi ENS-a za vrijeme izvođenja poslova moraju paziti da vibracije svedu na minimum i tako smanje bilo kakav uticaj na stabilitet Stare elektrane.

U planu je da se cijelokupna rekonstrukcija završi do 2024. Njenim završetkom grad Ljubljana će dobiti jedno novo energetsko srce koje će iza starih zidina pumpati mnogo snažnije.

**EN** Plant is located in a building constructed in 1898 in downtown Ljubljana. For years now, this 110/20 kV substation, named Center, has been operating successfully only several dozens of meters away from a theatre scene, within an impressive and authentic complex, industrial purpose of which had been changed to meet needs of cultural development. This substation serves to power the centre of the Slovenian capital.

However, this summer brought changes with it. Works on reconstruction of 110/20 kV substation

Center started behind the walls of a well-known Old Power Plant, to be performed simultaneously with new theatre plays.

## TRANSFORMATION ALONGSIDE INNOVATION

The idea to reconstruct substation Center emerged when maintenance of the substation became too demanding and when the capital of Slovenia began requiring a more secure power supply. The solution was obvious – substation Center will undergo a complex reconstruction to become a completely modernized new substation with GIS high-voltage 110/10 (20) kV plant.

Entire closed space within which the substation is located is being demolished, apart from the outer walls facing the street, and new premises are being constructed to house a new, modern, high-voltage GIS plant and a middle-voltage plant. Reconstruction is to be performed in five high-voltage bays: measuring bay, coupling bay, feeder bay and two transformer bays.

On this project, ENS as a consortium member is responsible for: civil engineering works, mechanical and electrical power installations, grounding, assembly and disassembly of MV and HV equipment, assembly works on MV equipment for in-house consumption and installation of HV cable terminations.

“Performing works within a building that belongs to a cultural heritage requires highly efficient and delicate approach. Therefore, only a very professional and experienced team can live up to the challenges implied by this project”, said Bojan Gale, ENS engineer.

During execution of specific stages of works old substation will remain live and operating. This will be the most demanding phase of overall reconstruction and will imply implementation of highest level of safety measures. During this phase, control and protection functions will temporarily be switched to 110/20 kV substation Žale.

There is one more issue on the table. These already delicate and complex reconstruction works are being executed within a very restricted space. Project clearly defines that the building of the Old Power Plant must not suffer any damages, under any circumstances. Consequentially, during execution of works, ENS teams will have to pay strict attention to reduce vibration to the lowest level possible, so as minimize any potential effect to the structural stability of the Old Plant.

Overall reconstruction is planned to be finished by year 2024. Once works are completed, Ljubljana will get a new beating heart, strongly pumping power behind the old walls.



# Dalekovodi budućnosti VELIKA PETORKA

Transmission lines of the future  
THE GRAND FIVE

ŠIROM EVROPE NAŠI TIMOVI ZA DALEKOVODE NALAZE  
SE U PRVOM PLANU NAJVAŽNIJIH ENERGETSKIH

**PROJEKATA.** Više od 1.360 kilometara dalekovodnih trasa, čiju izgradnju i rekonstrukciju realizujemo, ili smo je već okončali ove godine, potvrđuje da smo jedan od važnih aktera u stvaranju evropske energetske mreže. Ovo je pet projekata po kojima ćemo pamtitи ovu godinu.

THROUGHOUT EUROPE, OUR TRANSMISSION LINE TEAMS ARE AT THE FOREFRONT OF THE MOST IMPORTANT

**ENERGY PROJECTS.** More than 1.360 kilometers of transmission lines, construction of which we are either performing or have already completed during the year, firmly prove that we have one of the most prominent roles in creating a European power network. Here we present our five most memorable projects of the year.



Izgradnja 220 kV DV Hólasandslína 3  
Construction of 220 kV TL Hólasandslína 3

## SR ŠVEDSKA – NOVI LINK U SRCU ZEMLJE

U prethodnoj deceniji naši timovi za dalekovode bili su u prvom planu najznačajnijih i najizazovnijih energetskih projekata u ovoj oblasti u Švedskoj. Izuzetak u toj priči ne predstavlja ni izgradnja 400 kV dalekovoda Långbjörn-Storfinnforsen.

Trasa dalekovoda duga je 37 km i na njoj je podignuto 135 stubova. Bio je ovo jedinstven projekt u okviru kojeg smo još jednom doprinijeli jačanju energetskih kapaciteta Švedske.

Naši timovi angažovani na ovom projektu imali su zadatku da realizuju poslove montaže, podizanja stubova i elektromontažne radove na cijeloj trasi.

Izgradili smo dalekovod sa šest tipova stubova, među kojima posebno mjesto zauzimaju tipski stubovi, poznati pod nazivom „stubbe“, koji teže do 60 tona i visoki su do 37,5 metara.

U fazi elektromontažnih radova na ovom kompleksnom poduhvatu naše ekipe izvele su instalaciju triplex provodnika  $3 \times 3 \times 910 \text{ mm}^2$ , zaštitnog užeta i OPGW-a. Inače, montaža provodnika ovako velikog promjera sama po sebi je kompleksan posao, naročito u teškim zimskim uslovima rada.

Izgradnja ovog dalekovoda bila je bitka sa vremenskim uslovima, ali i vremenskim rokovima i rizicima posla. Radilo se i u zimskim uslovima dok su temperature padale ispod minus 30 stepeni celzijusa. Ni toplij period nakon zime nije olakšao okolnosti na terenu, jer su tada u prvi plan izašle sve nedaleće močvarnog terena koje su otežavale izvođenje radova. Radovi na ovom dalekovodu spadaju u kategoriju poslova visokog rizika, zbog toga što su se određene etape odvijale iznad dva dalekovoda koji su u vrijeme radova bili pod naponom.

Novi dalekovod pušten je pod napon u junu, a njegovom izgradnjom stvorena je nova i stabilnija energetska veza između dvije hidroelektrane u centralnoj Švedskoj. U širem energetskom kontekstu ovaj dalekovod imaće ulogu u povezivanju vjetroparkova iz ovog dijela zemlje na elektroenergetsku mrežu.

## ISLAND – DALEKOVOIDI NOVE GENERACIJE

Zbog svoje posebnosti i zahtjevnosti, izgradnja dalekovoda nove generacije na Islandu zauzima posebno mjesto u našem portfoliju. To su projekti čija realizacija traži posebno spretne, spremeće profesionalne ekipe.

Naši timovi su, gradeći 64 kilometra najsavremenijih dalekovoda nove generacije, u okviru projekta izgradnje 220 kV DV Hólasandslína 3, napravili novi važan korak u ovoj kategoriji posla.

Naše ekipe na Islandu Our teams on Iceland



Trasa 220 kV dalekovoda Hólasandslína 3 polazi od Akureyrija na sjeveru do Hólasandura na sjeveroistoku zemlje.

Ona je izuzetno zahtjevna i prelazila je preko planina, rijeka, močvara i snježnih planinskih područja. Ovo su predjeli u kojima vlada oštra klima, a vremenski uslovi naglašeno su nepredvidivi. To znači da se u veoma kratkim periodima smjenjuju vjetrovita, sunčana, maglovita, kišna i snježna razdoblja.

Montaža dalekovoda u ovakvim uslovima nije lak posao, jer se oni pod udarima vjetra i leda blago savijaju. Ovo znači da montažu svakog stuba treba realizovati uz podršku mehanizacije. Taj trud se dugoročno isplati, jer ovi stubovi uspješno odolijevaju ekstremnim uslovima. Stubovi su cjevastog tipa i njihova visina seže do 31 metar, a svaki stub je toliko moćan da mijenja pet postojećih drvenih stubova koji su na ovim trasama postavljeni prije više od 40 godina.

Dalekovodi nove generacije pravi su iskorak u izgradnji elektroprenosnih mreža novog doba. Novu generaciju dalekovoda od starih prije svega razlikuju njihova izdržljivost i dizajn, odnosno performanse, zahvaljujući kojima mogu da izdrže najteže vremenske uslove sjevernih zemalja. Njihove konstrukcije nisu upadljive u prirodnom okruženju, što je dizajn kojem moderna energetika teži.

## NJEMAČKA – ZADATAK VISOKOG RIZIKA

Nakon što smo prije tri godine uspješno zakoračili na tržište Njemačke, zemlje čiji su standardi montaže tehničke opreme najzahtjevniji u Evropi, nastavljamo niz uspješno realizovanih projekata u ovoj oblasti.

Naše ekipe ove godine bile su dio rekonstrukcije dvosistemskog dalekovoda 380 kV Borken-Mecklar, koji povezuje dvije istoimene trafostanice u oblasti Hesen.

Radovi su izvođeni na dionici dugo oko šest kilometara. Dalekovodni stubovi bili su čelično-rešetkastog tipa, a njihova prosječna visina iznosi 35 metara.

Naši zadaci obuhvatili su demontažu starog i montažu novog provodnika, zamjenu zaštitnog užeta i instalaciju OPGW-a.

Još jednom smo realizovali zadatke koji spadaju u kategoriju poslova visokog rizika.

Naime, naše ekipe izvodile su radove na drugom sistemu, dok je sve vrijeme prvi sistem bio pod naponom. Još jednom smo pokazali veliko umijeće rada pod pritiskom, jer su se određeni radovi odvijali po striktno utvrđenom planu za vrijeme perioda mrežnih isključenja.

Ekipe angažovane na ovom projektu sasvim sigurno će ga pamtitи по некада okrutnim i nepredvidivim vremenskim uslovima te specifičnim zahtjevima zaštite životne sredine koje je trebalo ispuniti. One su takođe ispunile visoke standarde zaštite na radu i to u izuzetno kratkim rokovima.

Realizacijom ovog projekta podmlaćeni su vitalni dijelovi ovog dalekovoda, čime mu je veoma značajno produžen životni vijek.

## BOSNA I HERCEGOVINA – NA EVROPSKOM TIBETU

Ekipa Divizije za dalekovode u BiH ove godine gradi 2x110 kV dalekovod za hidroelektranu

Ulog (35 MW), koja se gradi u donjem toku rijeke Neretve. Ovaj dalekovod će u budućnosti povezivati HE Ulog sa postojećim 110 kV dalekovodom Gacko–Nevesinje.

U okviru izgradnje 20,5 kilometara duge trase novog dalekovoda naše ekipe podižu 84 čelično-rešetkasta stuba, izvode elektromontažne radove i instalaciju OPGW-a. Ovaj projekt naši timovi realizuju po sistemu „ključ u ruke“.

Svi ovi zahtjevni zadaci odvijaju se na nadmorskoj visini od 1.200 metara, na visoravni Morine, koju mnogi zovu evropski Tibet.

Okrutna, ali prekrasna geografija, zajedno sa oštrom klimom, čije su glavno obilježje oštri vjetrovici i strmi tereni, pred naše timove svakodnevno stavljaju nove izazove.

Upravo zato je pravo vrijeme za izvođenje radova bilo ljeto. Tada je na terenu izgradnje ovog dalekovoda radilo 40 naših radnika, koji su istovremeno realizovali montažu stubova, izvodili elektromontažne radove i instalaciju OPGW-a.

Prosječna težina stubova koji se podižu iznosi između šest i osam tona, a njihova visina seže do 42 metra.

Izgradnja ovog dalekovoda i HE Ulog je novi značajan garant stabilnosti elektroenergetske mreže u južnom dijelu BiH.

## SRBIJA – IDEMO NA JUGOZAPAD

Jugozapad Srbije u posebnom je fokusu aktivnosti naših dalekovodnih timova. Nakon što smo ovog ljeta uspješno završili rekonstrukciju 400/220/110 kV trafostanice Kraljevo 3 i 110/35 kV trafostanice Novi Pazar 1, ove jeseni zakoračili smo u poduhvat izgradnje dvostrukog 110 kV dalekovoda između njih.

Novi 2x110 kV dalekovod TS Kraljevo 3-TS Novi Pazar 1 biće važna karika energetske stabilnosti između ova dva grada.

Svojom dalekovodnom trasom on će prelaziti preko brdsko-planinskog terena kroz teritorije grada Kraljeva, zatim preko oblasti Raške sve do Novog Pazara.

Dalekovod će biti dugačak 64 kilometara, na njegovoj trasi biće podignuta 223 stuba, a njegova izgradnja trajeće do jula 2024. godine.

Našim ekipama povjereni su građevinski i elektromontažni radovi na drugoj dionici trase ovog dalekovoda. U okviru građevinske etape realizujemo izradu temelja i donjih dijelova dalekovodnih stubova, zatim podižemo stubove, dok u elektromontažnoj fazi radimo ugradnju faznih provodnika, staklenih izolatora, OPGW-a, spojne i ovjesne opreme.

Realizacija ovog projekta donijeće novo sigurno i stabilno snabdijevanje električnom energijom korisnicima u ovoj regiji, a on je

Na terenu izgradnje 400 kV DV Långbjörn-Storfjärnsforsen On the construction site of 400 kV TL Långbjörn-Storfjärnsforsen





Nastavljen niz uspješno realizovanih projekata u Njemačkoj A sequence of successfully performed projects in Germany continues

svakako još jedna bitna potvrda važnosti angažmana naših ekipa na planu stvaranja snažne energetske mreže Srbije.

#### **EN SWEDEN – A NEW LINK IN THE HEART OF THE COUNTRY**

In the previous decade, our transmission line teams were in the focus of the most significant and most challenging power projects in Sweden. Construction of a 400 kV transmission line Långbjörn-Storfinnforsen is not an exception.

The transmission line route is 37 km long. 135 towers were erected. This was a unique project through which we once more contributed to the strengthening of Swedish power capacities.

Our teams on this project were assigned with the task to perform assembly and erection of

all towers as well as overall electrical assembly works on the entire route.

Six different types of towers were erected during the construction of this transmission line. Among these, the most prominent ones are the towers called "stubbe" that weigh up to 60 tons, their height reaching unbelievable 37,5 meters.

While performing stringing works on this complex project our teams installed a 3x3x910 mm<sup>2</sup> triplex conductor, earth wire and OPGW cable. Installation of a conductor of such a large diameter is a complicated task by itself, even more so under adverse weather conditions.

Construction of this transmission line was a true battle with the weather and also with the tight time schedule and implicit risks. Works were carried out in winter when temperatures

tend to fall below minus 30 degrees Celsius. Coming of the warmer weather after winter did not give us much relief because spring made it obvious to us how difficult it will be to work on swampy terrain. Works performed to construct this transmission line are categorized as high risk activities because specific phases of works were conducted above two power transmission lines that were energized at the time of works execution.

The new transmission line was energized and commissioned in June, creating thereby a new and more stable power connection between two hydro power plants in central Sweden. Looking from a wider perspective, this transmission line will play an important role in connecting the wind parks in this part of the country to the electrical power transmission network.



U prvom planu najzahtjevnijih projekata Švedske At the forefront of the most challenging projects in Sweden

## ICELAND – NEW GENERATION TRANSMISSION LINES

Thanks to how demanding and specific it was, the construction of a new generation transmission line in Iceland holds a very special place in our portfolio. Projects such as this one require extremely skillful, well-prepared and professional teams.

By constructing 64 kilometers of top-notch new generation transmission lines on project 220 kV Hólasandslína 3, our teams made a new bold step forward in this sphere of operation.

The route of the 220 kV transmission line Hólasandslína 3 starts at Akureyri and in the north and ends at Hólasandur in the northeast.

This route is very challenging. It passes through hills, rivers, moors and snowy mountains, all forming a region of characteristically harsh and unpredictable weather where periods of wind, sun, fog, rain and snow take turns one after another extremely briefly.

It is everything but an easy job to build a transmission line under such circumstances, particularly considering the fact that transmission lines tend to bend slightly under the impact of wind and ice. This is to say that each tower must be erected with the support of mechanization. The effort pays off in the long run because the towers erected in this way successfully defy extreme weather conditions.

The towers are tubular. Being 31 meter high, each tower is strong enough to replace

five existing wooden poles installed on these routes more than 40 years ago.

New generation transmission lines are a significant advancement in the construction of electrical power distribution networks of the future. The most significant difference between these new generation transmission lines and their predecessors is the durability and the design meaning their overall performance thanks to which they can resist the most severe weather conditions prevailing in the northern countries.

In terms of their structure, these towers do not stand out in the landscape which is a general goal of modern electrical engineering design.

## GERMANY – A HIGH RISK ASSIGNMENT

It has been three years since we entered the German market, known for its severe standards governing installation of technical equipment, which are in fact the strictest in the whole of Europe. Yet, we managed to maintain a trend of successful projects completed in the country precisely in this type of projects.

This year, our teams participated in the reconstruction of a double-circuit 380 kV transmission line Borken-Mecklar which connects two substations in Hesen region.

Works were executed on an approximately six kilometers long route. Steel lattice towers,

were erected, average height of which reaches 35 meters.

We were assigned to dismantle the old and install a new conductor, replace the earth wire and install the OPGW.

Once again we performed the high risk works.

Namely, our teams executed works on one circuit while the other circuit remained live for the whole time. Once again, our employees showed a great skill of working under pressure since part of works were performed per strictly defined plan during periods of network outages.

Teams engaged in this project will most certainly remember it by occasionally cruel and unpredictable weather conditions and specific environmental requirements that had to be met. At the same time, works assigned to them were performed in accordance with high occupational health and safety standards and quite a tight time schedule. Vital parts of the total transmission line got renewed which significantly extends its lifetime.

## BOSNIA AND HERZEGOVINA – ON THE TIBET OF EUROPE

This year, Transmission Lines Division teams are building a 2x110 kV transmission line for hydro power plant Ulog (35 MW) which is being constructed in the lower course of the Neretva. This transmission line will connect future HPP Ulog to the existing 110 kV transmission line Gacko-Nevesinje.

During the construction of this transmission line, along a 25 kilometers long route, our teams are erecting 84 steel lattice towers, performing electrical assembly works and installing the OPGW, all within a turn-key project.

All these demanding tasks are being performed at 1.200 meters above sea level, on a plateau Morine, called the Tibet of Europe by many.

A vicious but gorgeous landscape, combined with a harsh climate dominated by strong winds and steep terrain represents a new daily challenge for our teams.

It is precisely for this reason that summer was the right time for execution of these works. 40 of our employees worked on this site during the summer, simultaneously performing the erection of towers, electrical assembly works and OPGW installation.

The average weight of the towers erected is six to eight tons and their height reaches 42 meters.

Construction of this transmission line and HPP Ulog is a new important guarantor of the stability of the electrical power network in the southern part of B&H.

## SERBIA – HEADING SOUTHWEST

Our teams have set their eyes on the southwestern part of Serbia. After completion of the reconstruction of 400/220/110 kV substation Kraljevo 3 and 110/35 kV substation Novi Pazar 1 this summer, with autumn came the construction of a double-circuit 110 kV transmission line between these two substations.

New 2x110 kV transmission line SS Kraljevo 3-SS Novi Pazar 1 will play an important role in providing a stable power supply between the two cities.

The route of this transmission line will cross mountain areas, starting from the territory of Kraljevo, over the Raška region all the way to Novi Pazar.

The transmission line will be 64 kilometers long and 223 towers will be erected on the route. Works are expected to be completed until July 2024.

Our teams have been entrusted with civil works and stringing. Within the civil works, we are constructing the foundations and the bottom parts of the towers, then we erect towers. The stringing works include installation of phase conductors, glass insulators, OPGW and suspension and jointing equipment.

Completion of this project will bring a new and stable power supply for the end users in this part of the country and it will serve as another confirmation of how important our teams are for the creation of a strong power network in Serbia.

Novi 2x110 kV DVTS Kraljevo 3-TS Novi Pazar 1  
New 2x110 kV TL SS Kraljevo 3-SS Novi Pazar 1



# ENERGETSKA SPONA U SRCU NJEMAČKE

ENERGY LINK IN THE HEART OF GERMANY

**ELNOS GRUPA VEĆ TRI GODINE U  
NJEMAČKOJ,** zemlji koja je najsnažnija  
privreda u EU, potvrđuje svoja znanja,  
profesionalni potencijal i visok stepen  
tehničkih standarda.

**FOR THREE YEARS IN A ROW, ELNOS  
GROUP** has been proving its knowledge,  
professional potential and high level of  
technical standard in Germany, a country  
known as the strongest EU economy.

Izgradnja novog 380 kV DV Wahle-Mecklar Construction of new 380 kV TL Wahle-Mecklar



**SR** Mogućnosti koje su nam otvorene u ovoj zemlji do sada smo uspješno iskoristili kroz realizaciju više projekata u oblasti dalekovoda. Ove godine naši timovi napravili su važan iskorak kroz učeće u izgradnji novog 380 kV dvosistemskog dalekovoda Wahle-Mecklar.

Ovaj dalekovod nalazi se u neposrednoj blizini grada Kassel, u pokrajini Hessen, u srednjem dijelu Njemačke. Naš tim je, od aprila do oktobra, realizovao elektromontažne radove i instalaciju OPGW-a na šest kilometara dugoj dionici dalekovoda.

„Ovaj 380 kV dalekovod je izgrađen sa četiri provodnika po fazi, po čemu se razlikuje od ostalih zemalja u kojima smo ranije radili. To je znaločilo da smo morali primijeniti drugačije metodologije pri instalaciji“, rekao je Branko Marković, projekt menadžer Elnos Grupe.

Ovo je još jedan od projekata u okviru kojih smo savladali zadatke iz kategorije najvišeg rizika. Naše ekipe realizovale su radove na ukrštanju sa privremenim 110 kV dalekovodom, koji su ranije takođe gradili naši timovi. Ovaj 110 kV dalekovod za vrijeme izvođenja poslova bio je pod naponom, tako da se posao odvijao uz maksimalno poštovanje mjera bezbjednosti i opreza.

## RAD UZ PODRŠKU HELIKOPTERA

Uslovi i regulative Njemačke u oblasti bezbjednosti i zaštite na radu te zaštite životne okoline su na izuzetno visokom nivou.

Pri izvođenju radova morale su se poštovati veoma striktnе mjere bezbjednosti kako bi biljni i životinjski svijet, ali i posebni reljefi ovog podneblja, sve vrijeme trajanja radova bili zaštićeni. Naši timovi i mehanizacija mogli su se kretati samo po striktno obilježenim trasama, a kontrole poštovanja svih radnih standarda bile su detaljne i svakodnevne.

„Upravo zbog toga što se dalekovod nalazi u zaštićenom području gdje je rad regulisan posebnim ekološkim propisima, odlučili smo da razvlačenje radnog konopca, uz čiju pomoć se ugrađuje provodnik, izvedemo uz podršku helikoptera. Bila su nam potrebna tri dana veoma dinamičnih priprema da bismo organizovali tri sata sjajnog posla. Na kraju su uslijedili veliko olakšanje i uspjeh. Sasvim je sigurno da će spektakularnu realizaciju tog posla naše ekipe dugo pamtitи“, rekao je Marković.

Bilo je vrlo zahtjevno ispunjavati sve ove stroge ekološke uslove zaštite pri izvođenju radova u izuzetno kratkim rokovima, ali sa zadovoljstvom možemo istaći da smo na kraju sve standarde u potpunosti ispoštovali.



Rad u zaštićenom području prirode Working in the protected area

## ZNAČAJ PROJEKTA

Novi 380 kV dalekovod Wahle-Mecklar povezao je trafostanicu u mjestu Wahle, kod grada Braunschweig, sa trafostanicom Mecklar, kod mjesta Ludwigsau. Izgradnja ovog dalekovoda važan je korak ka jačanju strukture same mreže ovog dijela Njemačke s ciljem proširenja kapaciteta prijema većih količina obnovljive energije u mrežu.

**EN** We successfully explored all the options offered to us in this country, and we did so by completing several transmission line projects. This year, our teams made an important step forward by participating in the construction of a new 380 kV double-circuit transmission line Wahle-Mecklar.

This transmission line is located in the Hessen region, in the direct vicinity of a town named Kassel, in central Germany. From April to October, our team performed stringing works and installed OPGW on six kilometers long transmission line route.

“This 380 kV transmission line is built with four-bundle conductors which was different from any other country we worked in previously. It meant using a different methodology during installation”, said Branko Marković, Elnos Group Project Manager.

This is one more project that implied performing high risk assignments. Our teams performed the works on an intersection with a temporary 110 kV transmission line, previously built also by our teams. During the execution of works, this 110 kV transmission line remained energized. This required the highest caution and strictest compliance with safety measures.

## WORKING WITH HELICOPTER SUPPORT

German legislation and requirements governing the domain of occupational health and safety and environmental protection are extremely tough.

Very strict safety measures had to be complied with during the execution of works, in order to protect the wildlife and the landscape of the region. Our teams and mechanization were allowed to move using only strictly defined routes and compliance with all standards was checked daily and thoroughly.

“The fact that works are being executed within a protected area, where works are governed by specific environmental regulations, was the very reason why we decided to string the pre-rope for installation of conductors with helicopter. It took us three very dynamic days to prepare for three hours of magnificent work, followed by great relief and a feeling of achievement. Our teams will most certainly remember the spectacular completion of this assignment“, said Marković.

It was rather demanding to meet all the strict environmental and health and safety requirements while working on tight deadlines. However, we are proud to say that in the end, we managed to comply with all the standards.

## IMPORTANCE OF THE PROJECT

New 380 kV transmission line Wahle-Mecklar connected substation in Wahle, near the town Braunschweig, with substation Mecklar near the town named Ludwigsau. Construction of this transmission line is an important step towards strengthening the structure of the transmission network in this part of Germany, with an aim to expand capacities to integrate renewable energy sources.

# 1.000 KILOMETARA U JEDNOM DAHU

1.000 KILOMETERS  
IN ONE BREATH

**OD SJEVERA DO SRCA ŠVEDSKE,** dionicom koja prelazi nevjerojatnih 1.000 kilometara živopisnih pejzaža ove zemlje, timovi Elnos Grupe izveli su rekonstrukciju 400 kV dalekovoda Porjus-Grundfors i Grundfors-Storfinnforse. Ovo su do sada najduže dalekovodne trase na kojima je Elnos Grupa radila u Švedskoj.

**FROM THE SWEDISH NORTH TO THE HEART OF THE COUNTRY,** on a route cruising through 1.000 kilometers of breathtaking landscapes, Elnos Group teams performed a reconstruction of 400 kV transmission lines Porjus-Grundfors and Grundfors-Storfinnforse. So far, those are the longest transmission line routes Elnos Group has been working on in Sweden.



**SR** Rekonstrukcija ovih dalekovoda bila je najizazovnija misija Elnos Grupe u Švedskoj ove godine. Njena realizacija spada u visoko cijenjenu kategoriju zadataka u oblasti elektroenergetike koji se, uprkos nevjerojatnim okolnostima, moraju realizovati hirurški precizno. Bio je ovo zadatak koji zahtjeva najviši nivo iskustva, spretnosti i požrtvovanosti, čija realizacija je posebna radna avantura.

Trase 400 kV dalekovoda Porjus-Grundfors i Grundfors-Storfinnforse protežu se od sjevera do središta zemlje. U svom nazivu one nose imena hidroelektrana Porjus, Grundfors i Storfinnforse, ključnih energetskih tačaka koje spajaju.

Ovi dalekovodi prelaze preko rijeka, jezera i planina koje spadaju u najfascinantnije prirodne ljepote ove zemlje.

Misija naših ekipa, prema zahtjevima projekta, odvijala se isključivo u periodima mrežnih isključenja koja su trajala od jula do oktobra prošle i od jula do novembra ove godine.

Bili smo zaduženi za izvođenje šireg spektra radova na cijeloj dužini dalekovoda. Na određenim sekcijama mijenjali smo prigušivače vibracija, provodnike i izolatorske lance, dok smo cijelom dužinom trase instalirali novi OPGW.

S obzirom na to da se radilo u kratkim periodima, dinamika na terenu često je bila usijana. Našim ekipama nerijetko gotovo ništa nije išlo u prilog.

„Radilo se pod ogromnim pritiscima rokova, tako da je dinamički plan izvođenja radova bio maksimalno napregnut. Realizaciju radova na dalekovodnoj trasi koja je veoma dugačka otežavali su malobrojni pristupni putevi, ali i veoma visoka vlažnost vazduha. Stubovima je često bilo gotovo nemoguće prići. U septembru, uz podršku mehanizacije, na terenu ovog projekta radilo je 75 naših ljudi. Samo zahvaljujući odličnoj i efikasnoj kombinaciji ljudstva i tehnike uspjeli smo održati dobar tempo odvijanja projekta. Bio je ovo zaista težak i veliki podvig naših timova iz Švedske, Srbije, BiH, S. Makedonije, Slovenije i Poljske”, rekao je Slobodan Mičić, rukovodilac gradilišta Elnos Grupe.

## ZNAČAJ PROJEKTA

Ova dva dalekovoda nakon rekonstrukcije biće snažnija i sigurnija energetska poveznica između sjevera i juga zemlje. Pored toga, ove energetske spone u budućnosti će imati značajnu ulogu u integraciji energije iz sve većeg broja vjetroparkova u elektroenergetsku mrežu zemlje.

Rekonstruisani dalekovodi donose i neuobičajene benefite poboljšanja sistema prenosa električne energije, povećanja stabilnosti i kvaliteta snabdijevanja energijom.

## POD BUDNIM OKOM VOJSKE ŠVEDSKE

Izvodeći radove, naše ekipe su se prvi put našle u središtu do sada nepoznatih i nesvakidašnjih okolnosti. Naime, u jednom trenutku lokacija odvijanja radova je bio vojni poligon vojske Švedske. Rad u ovoj zoni nam je nametnuo posebna pravila, što je podrazumijevalo dostavljanje specifične dokumentacije za rad, poštovanje posebnih procedura te ulazak i izlazak na teren pod pratinjom vojske.

**EN** Reconstruction of these transmission lines was the most challenging mission Elnos Group carried out in Sweden this year. Realization of such a project is considered a praiseworthy endeavor in the domain of electrical engineering, since respective tasks have to be implemented with surgical accuracy, despite barely conceivable circumstances. Assignments such as this one require the highest possible level of experience, skill and dedication. To perform them means to complete an adventure.

The routes of the 400 kV transmission lines Porjus-Grundfors and Grundfors-Storfinnforsen stretch from the north to the center of the country. They carry the names of three hydro power plants Porjus, Grundfors and Storfinnforsen, the key points of the transmission lines.

The route of the transmission lines navigate across rivers, lakes and mountains, all comprising the most fascinating landscape of the country.

According to the project requirements, works assigned to our teams were performed within strictly defined outages lasting from June to October last year and from July to November this year.

Within this project, we performed a wide scope of works on the full length of the transmission line. We replaced vibration dampers, conductors, insulators and fittings on defined sections and installed a new OPGW on the entire route.

Since works were executed within short time periods, the construction site was often swirling with action. The circumstances our teams were faced with were most often completely adverse.

"We were highly pressured by the deadlines. The time schedule was as tight as possible. The lack of access roads made the works on such a long route even harder. Above all, air humidity was unbelievably high. We often had much

trouble accessing the towers. 75 Elnos employees worked on this site in September, with support of mechanization. It is only through an outstanding and efficient combination of manpower and mechanization that we managed to maintain solid dynamics of project realization. This was a difficult task, for sure, and an enormous venture of our teams from Sweden, Serbia, B&H, N. Macedonia, Slovenia, and Poland", said Slobodan Mičić, Site Manager at Elnos Group.

## IMPORTANCE OF THE PROJECT

After reconstruction, these two transmission lines will form a stronger and more secure energy connection between country's northern and southern regions. Moreover, these energy links will have an even more important role in energy integration in the future, due to an increased number of wind parks being constructed in the country.

These reconstructed transmission lines bring many undisputable benefits – the electrical power transmission system is improved and the power supply became more stable.

## UNDER THE WATCHFUL EYE OF THE SWEDISH ARMY

While executing these works, our teams were faced with circumstances yet unknown and unfamiliar to them. Namely, at one point the location of the work was a military compound of the Swedish army. Working in this area meant obeying strict rules. This implied delivery of specific documentation for work, acting in accordance with previously defined procedures and entry to and exit from the site accompanied by the military forces.

Trase se protežu od sjevera do središta Švedske The routes stretch from the north to the center of Sweden





Na gradilištu Vest Ruislip At the West Ruislip site

# High Speed 2 – NAJVEĆI ZADATAK VELIKE BRITANIJE

High Speed 2 – THE GREATEST TASK FOR GREAT BRITAIN

## VELIKO IME POTVRĐUJE SE VELIKIM DJELIMA.

Vodeći se ovim, Velika Britanija ove godine nastavlja izgradnju željeznice High Speed 2 (HS2). Hiljade radnika angažovanih na ovom megaprojektu u službi su izgradnje ultrabrzre željeznice nove generacije. Kao dio ovog poduhvata Elnos Grupa svakodnevno uspješno savladava nove zadatke i pobjeduje kompleksne izazove struke.

**GREAT DEEDS MAKE A BIG NAME.** Following this principle, this year, Great Britain continues with construction of High Speed 2 (HS2). Thousands of workers are engaged in this mega project to construct an ultra-speed new generation railway. As a part of this endeavor, Elnos Group successfully completes new assignments on daily basis, thereby overcoming highly complex professional challenges.

**SR** S razlogom ga zovu megaprojekat vijeka. High Speed 2 je trenutno najveći infrastrukturni projekt u Evropi i ime buduće željezničke pruge za ultrabrzne vozove koja će povezivati najveće britanske gradove.

Splet ove ultramoderne željezničke infrastrukture u konačnici će biti dugačak 676 km, a brzina vozova na njoj će sezati do nevjerojatnih 400 km/h. Ekipte Elnos Grupe od početka godine dio su ogromne radne mašinerije angažovane na poduhvatu High Speed 2.

Naša kompanija, u saradnji sa partnerskom britanskom kompanijom Emico, a posredstvom zajedničke kompanije EMEL Power iz Velike Britanije, zadužena je za posao projektovanja, izrade, isporuke i instalacije 46 distributivnih trafostanica koje se stavlaju u službu napajanja tri gradilišta ovog projekta – Vest Rajsliп, Atlas Roud i Viktorija Roud Krosover Boks u sjeverozapadnom Londonu.

## PROJEKTOVANJE – SRCE SVAKOG PROJEKTA

Sve je počinjalo od inženjerskog tima u Banjaluci, koji je u saradnji sa kolegama iz kompanije Emico, projektovao distributivne trafostanice po mjeri projekta HS2. Našem timu povjeren je kompleksan posao projektovanja distributivnih trafostanica za tri gradilišta.

Ove trafostanice predstavljaju specifična, po mjeri izrađena rješenja koja su projektovana po striktnim britanskim standardima i odgovaraju najsavremnjim potrebama tržišta. Našim isprojektovao je distributivne trafostanice od naponskog nivoa 11 kV/0,4 kV i snage 630 kVA do naponskog nivoa 11 kV/20 kV i snage 8 MVA, a njihova dužina seže od pet do dvanaest metara.

„Svaka distributivna trafostanica koju smo projektovali razlikuje se po opremi koju sadrži i predstavlja istinski proizvod za sebe. Sve smo ih isprojektovali tako da odgovaraju prostornim ograničenjima gradilišta, opremi koja se u njih uklapa, transportu i nizu drugih uslova“, rekao Mitar Vadić, vodeći inženjer Elnos Grupe.

Uspješnom realizacijom ove etape naša kompanija potvrdila je da je stručno osposobljena za kompleksnu djelatnost projektovanja distributivnih trafostanica za napajanje gradilišnih mašina na projektu.

## MONTAŽA „PO MJERI“ PROJEKTA

Nakon projektantske faze radovi se sele u Elektromontažne radionice (EMR) Beograd i Banjaluka. Zadatak naših ekipa je da, poštujući striktne tehničke zahtjeve, složenu i savremenu

tehnologiju uklope u izuzetno mali prostor. Bio je ovo pravi test znanja i inovativnosti na polju praktičnog rješavanja problema. Komponente za montažu distributivnih trafostanica stižu iz BiH, Srbije, Velike Britanije, Poljske, Italije i Francuske. U njih se instaliraju: transformatori, SN postrojenja, NN ormari, SCADA sistemi, šinski razvodi, HVAC sistemi za klimatizaciju i ventilaciju te elementi opšte elektroinstalacije.

„Izrada ovakvih postrojenja za britansko tržište donijela je niz specifičnih izazova, a među njima je posebno kompleksno bilo pronaći način za usklajivanje tehničkih rješenja sa britanskim standardima.

Pored toga, posebno zahtjevno bilo je i monitorirati sve elemente trafostanica u vrlo skućenom prostoru. Ipak, trudom i inovativnim pristupom uspjeli smo da odgovorimo na sve postavljene zahtjeve“, rekao je Nebojša Milosavljević, rukovodilac Proizvodno-logističkog centra u EMR Beograd.

Radovi na montaži distributivnih trafostanica u EMR Beograd počeli su u februaru, a prva postrojenja bila su spremna za isporuku u aprilu.

„Kada završite ovakvo postrojenje, znate da ste dali svoj maksimum, ali i da će najveći test rada cijele vaše ekipе biti vidljiv na terenu, u trenutku prikљučenja postrojenja na gradilištu. Kada smo ‘ispratili’ trafostanice u Veliku Britaniju, uslijedio je period iščekivanja nijehovog prikљučenja na terenu. Povratna informacija da su postrojenja uspješno puštena u rad, i to uz pohvale investitora, za nas je bila veliko zeleno svjetlo i ogromna motivacija za nastavak rada“, ističe Milosavljević.

Sve distributivne trafostanice izrađene u našim radionicama prošle su fabrička i sajt testiranja. EMR timovi su do sada za potrebe tri gradilišta na kojima smo angažovani, proizveli i uspješno isporučili 40 distributivnih trafostanica.

## PUTOVANJE DUGO 2.000 KILOMETARA

Svoj 2.049 kilometara dug transport od Beograda do gradilišta Vest Rajsliп u Velikoj Britaniji prve distributivne trafostanice montirane u Elnosovim EMR radionicama u Beogradu počele su u aprilu ove godine. Na toj putniji one su prošle kroz sedam država: Srbiju, Mađarsku, Slovačku, Češku, Njemačku, Belgiju i Francusku, da bi u završnici trajektima bile prevezene preko kanala Lamanš na gradilište Vest Rajsliп.

Za potrebe prevoza distributivnih trafostanica, čija visina seže do tri metra, angažovani

su megašleperi. Logistički poduhvati poput prevoza distributivnih trafostanica iziskuju veliki trud na planu poštovanja mjera zaštite i bezbjednosti te požrtvovan angažman logističkog tima Elnos Grupe. Zahvaljujući dobroj pripremi, transport svih do sada realizovanih isporuka prošao je u savršenom redu.

## GRADILIŠTE – NAJVEĆI TEST PROJEKTA

Svaki inženjerski projekat u svom radnom dnevniku posebnim slovima ima zapisan dan velikog testa. Za naše ekipе angažovane na realizaciji poduhvata High Speed 2 to je bio dan montaže prve distributivne trafostanice na gradilištu Vest Rajsliп.

Njeno prikљučenje uspješno je izvršeno nakon što su završene faze podešavanja i dodatnog povezivanja. Bio je to trenutak potvrde da smo napravili dobar posao.

„Izgradnja pruge HS2 najveći je građevinski i infrastrukturni poduhvat u Velikoj Britaniji te jedan od najvećih aktuelnih projekata u Evropi. Trenutak kada je pokrenuta prva mašina za bušenje tunela koja se napaja preko naše distributivne trafostanice bio je veliki događaj, ne samo u našim očima, već i u očima britanske javnosti“, rekao je Predrag Ivanović, projekt-menadžer na ovom projektu.

Nakon instalacije prvi distributivnih trafostanica naše ekipе uspješno su nastavile posao montaže distributivnih trafostanica na gradilištima Atlas Roud i Viktorija Roud Krosover Boks.

Zanimljivo je da naše distributivne trafostanice napajaju gradilišne mašine uključujući i mašine poznate kao velike bušilice tunela (TBM mašine) – popularno zvane „krtice“. „Krtice“ su duge 140 metara, a naše ekipе su za jednu takvu mašinu izradile distributivnu trafostanicu snage 8 MW.

Svaka distributivna stanica opremljena je ormarom automatike koji omogućava daljinsku manipulaciju srednjeponskim prekidačima. U okviru ovog projekta Elnos Grupi povjeren je posao integracije SCADA sistema na tri gradilišne lokacije, kojim se vrši monitoring svih trafostanica iz udaljenog kontrolnog centra.

„Na poslovima povjerenim našim ekipama u okviru poduhvata HS2 u Srbiji i Velikoj Britaniji svakodnevno je angažovano 30 radnika Elnos Grupe. Danas, nakon što smo uspješno instalirali desetine distributivnih trafostanica u okviru projekta HS2, možemo biti sigurni da smo otvorili niz novih mogućnosti na tržištu Velike Britanije, ali i u oblasti izgradnje brzih pruga u drugim zemljama“, rekao je Ivanović.

**EN** This project is called a mega project of the century. And it's for a reason. At the moment, High Speed 2 is the largest infrastructure project in Europe connecting the biggest cities in Britain with high-speed trains.

Once completed, this top-notch railway infrastructure will be 676 km long. Trains will run at speed of an incredible 400 km/h. From the beginning of this year, Elnos teams have been a part of huge, heavy-duty machinery engaged on this project.

Together with our partner, a British company Emico, or more precisely through our joint company EMEL Power from Great Britain, Elnos has been entrusted with design, production, delivery and installation of 46 distribution substations to provide power supply for three construction sites within this project – at West Ruislip, Atlas Road and Victoria Road Crossover Box in north west London.

## DESIGN – AT THE HEART OF EVERY PROJECT

It all started with our engineering team in Banjaluka. In cooperation with their colleagues from company Emico, they designed the distribution substations to meet the specific needs of the HS2 project. Our engineering team has been entrusted with the task of designing substations for three construction sites. These substations are very specific, custom-made solutions, designed in line with strict British

standards corresponding to the latest market needs.

Voltage and power of the distribution substations designed by our team for this project range from 11/0,4 kV and 630 kVA to 11 kV/20 kV and 8 MVA. Their length varies from five to twelve meters.

"Each of the distribution substations designed is a unique product for itself since all of them are different in terms of the equipment they are supplied with. Each and every substation was designed in line with limitations on the construction sites in terms of available space, equipment to be installed within the substations, transport requirements and a series of other conditions", said Mitar Vadić, Senior project engineer at Elnos Group.

Successful completion of this project phase confirmed our company's expert skills in designing distribution substations to supply construction site machinery on highly demanding projects.

## A "CUSTOM-MADE" ASSEMBLY

Once the design phase was finished, our electrical assembly workshops (EMWs) in Belgrade and Banjaluka became quite busy.

The task for our teams is to fit a very complicated and modern technology within an extremely small package, complying with very restricting technical requirements throughout the entire process. This was a true test of

knowledge and innovation in practical problem solving. Components for assembly of the distribution substations come from Bosnia and Herzegovina, Serbia, Great Britain, Poland, Italy and France. The following is installed: transformers, MV plants, LV cabinets, SCADA systems, busbar trunking systems, HVAC systems for air conditioning and ventilation and other common electrical elements.

"Assembly of such plants for the British market carries many specific challenges with it. The most difficult part was to find a way to adjust technical solutions to British standards. Moreover, it was very demanding to assemble all substation elements inside a very small space. However, thanks to great efforts and an innovative approach, we managed to meet all the requirements set before us", said Nebojša Milosavljević, Manager of Production and Logistics Center in EMW Belgrade.

Works on the assembly of distribution substations in EMW Belgrade started in February. The first plants were ready to be delivered in April.

"When you finish assembling a plant such as this one, you know you have given the best of you. You also know that the work you and your team have done will be visible at the time the plant starts working on the construction site. When we "saw off" our substations to Great Britain we had to wait until they became operative on the site. The feedback we got was that the plants had been successfully commissioned

Dužina distributivnih trafostanica varira od 5 do 12 metara The length of the distribution substations ranges from 5 to 12 meters





Naš zadatak - napajanje tri velika gradilišta Our task – providing power supply for three major construction sites

and were highly commended by the client on the project. This was the biggest green light for us and a strong motivation to keep up the good work", Milosavljević pointed out.

All distribution substations made in our workshops in Belgrade passed all factory and site tests. EMW teams have so far assembled and delivered 40 distribution substations for three construction sites for which we have been engaged.

## A 2.000 KILOMETERS LONG TRAVEL

In April this year, the first distribution substations assembled in Elnos EMWs in Belgrade started their 2.049 km long journey from Belgrade to West Ruislip. On their journey, they crossed seven countries: Serbia, Hungary, Slovakia, Czechoslovakia, Germany, Belgium and France from where they were transported by ferries across La Manche to the construction site in West Ruislip.

Mega flatbed trucks were used to transport the distribution substations, the height of which reaches three meters. Transport such as this one is considered a logistical endeavor and required great effort to comply with safety

measures and devoted engagement by Elnos Group's logistics team. Thanks to well implemented preparation, transport of all substations delivered so far has been completed impeccably.

## CONSTRUCTION SITE – THE GREATEST TEST ON THE PROJECT

The day of the final test has a special place in the log of each engineering venture. For our teams engaged on the project, that was the day when the first distribution substation was installed at the West Ruislip site.

The substation was successfully commissioned after connecting and calibration had been completed. At that moment, we knew we did the job well.

"Construction of HS2 is the largest construction and infrastructure venture in Great Britain and one of the capital projects currently implemented in Europe. The moment when the first tunnel boring machine supplied from our distribution substation started working was a huge event, not only in our eyes but also in the eyes of the British public", said Predrag Ivanović, Project Manager on this project.

After the first distribution substations were successfully installed, our teams continued assembling substations for Atlas Road and Victoria Road Crossover Box construction sites.

What is interesting is that our distribution stations provide power for major construction equipment including tunnel boring machines (TBMs), so-called "moles". The TBMs are 140 m long and our teams made an 8 MW substation so that one such machine could run smoothly.

Each distribution substation is equipped with an automation cabinet that enables remote manipulation of middle-voltage switches. Within this project, Elnos teams have been assigned with integration of SCADA system on three site locations with the aim to monitor all substations from one remote control center.

"30 Elnos Group workers have been engaged on daily basis in Serbia and in Great Britain on tasks assigned to our company within the HS2 project. Today, following successful installation of dozens of distribution substations on this project, we can state with great certainty that we have opened many other opportunities for engagement in the British market and in railroad construction projects in other countries", said Ivanović.



Najveći infrastrukturni zadatak u Sloveniji The biggest infrastructural assignment in Slovenia

# U ZLATNOM POJASU KOPRA

## IN THE GOLDEN STRIP OF KOPER

### IZGRADNJA DRUGOG KOLOSIJEKA ŽELJEZNIČKE PRUGE

**DIVAČA-KOPAR** strateški je jedan od najvažnijih infrastrukturnih poduhvata u Sloveniji. Tačke ukrštanja novog kolosijeka sa 110 kV dalekovodom bile su prava mjesta potvrde umještosti ekipa ENS Slovenije.

### CONSTRUCTION OF THE SECOND TRACK OF A RAILWAY

**LINIE DIVAČA-KOPER** is a strategic and one of the most important infrastructur endeavours in Slovenia. Points of intersection of new rail with 110 kV transmission line indisputably confirm the competence and skill of ENS Slovenia teams.

### KOLOSIJEK ZA NOVO DOBA

Odgovoriti na izazove velikih infrastrukturnih projekata uvijek je bio posebno kompleksan poduhvat, a upravo na jednom ovako složenom zadatku veliki uspjeh ove godine zabilježili su timovi naše slovenačke članice.

Izgradnja drugog kolosijeka željezničke pruge Divača-Kopar strateški kotira kao jedan od najvažnijih i najzahtjevnijih infrastrukturnih poduhvata u Sloveniji.

Potrebu izgradnje drugog kolosijeka ove pruge u prvi plan lansirao je ubrzani privredni rast luke Kopar, koja je u proteklih nekoliko godina veoma značajno prestigla druge jadranske luke.

## ZADACI ENS-a

Putanja ovog 27 kilometara dugog kolosijeka na više mesta ukršta se sa 110 kV dalekovodom. Zadatak ekipa ENS-a odnosio se na izmještanje 110 kV dalekovoda na ukrštanjima sa novim kolosijekom pruge Divača–Kopar.

Ekipe ENS-a na četiri ukrštanja kolosijeka sa 110 kV dalekovodom te na budućem uključenju elektrovočne podstanice Črni Kal, izvršile su demontažu starih i montažu 11 novih dalekovodnih stubova. Pored toga, timovi su izvršili instalaciju ovjesne opreme, provodnika i sistema za sigurno uspinjanje.

Posao timova ENS-a najvećim dijelom odvija se u područjima zaštićene prirode i za vrijeme njegove realizacije timovi su ispunjavali posebne uslove iz oblasti zaštite životne sredine. Bila je ovo, između ostalog, i vremenski tempiranja misija, jer je dio radova morao biti realizovan u vrijeme veoma kratkih perioda isključenja dalekovoda.

## BENEFITI PROJEKTA

Prvi kolosijek pruge između Divače i Kopra star je više od 50 godina. Saobraćaj na ovoj željeznicici odvija se presporo i sa sve većim zakašnjenjima. Izgradnjom drugog kolosijeka pruge Divača–Kopar vozovi će moći da saobraćaju brzinom od 160 kilometara na sat, što će obezbijediti novi nivo povezanosti Kopra sa unutrašnjošću zemlje te uvezati luku sa dva važna evropska saobraćajna koridora.

„Projekat se odvijao na kraškom terenu i najvećim dijelom u područjima zaštićene prirode. Rad u ovakvim podnebljima zahtijeva veliki oprez. Uspješne realizacije projekta ne bi bilo bez požrtvovanosti rukovodilaca radova, ali i svih naših montera i saradnika na projektu“, rekao je Franci Milhar, inženjer ENS-a i rukovodilac radova na ovom projektu.

## EN A RAIL FOR A NEW AGE

Meeting the challenges of large infrastructure projects has always been a complex task. It is exactly on such an elaborate assignment where teams of our Slovenian member scored remarkable success.

Construction of the second rail of railway line Divača–Koper is strategically regarded as one of the most important and most demanding infrastructural endeavors in Slovenia.

The need to construct the second rail of this railway line became obvious due to accelerated commercial development of port Kopar, which has, in the last several years, significantly outgrown other Adriatic ports.

## ENS ASSIGNMENTS

The route of this 27 km long rail intersects with the 110 kV transmission line on several locations. ENS teams have been assigned with a task to relocate the 110 kV transmission line on the points of intersection with the new rail of railway line Divača–Koper.

On four such intersections with the 110 kV transmission line, as well as on location of future connection with traction substation Črni Kal,

ENS teams disassembled old and assembled and erected 11 new transmission line towers. They also installed suspension equipment, conductors and safety climb systems.

ENS teams were performing their works mainly in the protected areas. This means that during execution of works, the teams had to comply with very special environmental protection criteria.

Above all, the project was highly dependent on the timing of the planned activities, since specific parts of work had to be performed within very short outage periods.

“The project was implemented on a karst terrain and, for most of its part, in protected areas. Working in such an environment requires high caution. The project would not have been completed successfully had there not been for the dedicated work of our site managers, fitters and project associates“, said Franci Mihar, ENS Engineer and Site Manager on this project.

## PROJECT BENEFITS

The first rail of the railway line between Krivača and Koper is more than 50 years old. Traffic on this railway is too slow and has an increasingly high occurrence of delays. Construction of the second rail of the railway line Divača–Koper will enable a train speed of 160 kilometers per hour. This will bring traffic communication between Koper and the central part of the country to a whole new level. Koper will also get connected to two important European traffic corridors.

Dobra dinamika je dala poseban pečat projektu A project marked by excellent dynamics



# ENERGIJA ZA VRIJEME KOJE DOLAZI

ENERGY FOR  
TIME TO COME

RS

## RESETOVANJE SATA RESETTING A CLOCK

**SR** Završetkom rekonstrukcije MHE Raška uspješno smo završili sedmogodišnji projekat modernizacije sedam starih mini-hidroelektrana u zapadnoj Srbiji. Zahvaljujući revitalizaciji, nekadašnji biseri tehnike ponovo su u pogonu sa najmodernijim tehničkim rješenjima, što im obezbeđuje novih 50 godina rada.

**EN** By finalizing a reconstruction of MHPP Raška, we have successfully completed the seven years project of reconstruction of seven old mini hydro power plants in Serbia. Thanks to this revitalization, facilities that used to be the pearls of electrical engineering are now working again, equipped with the most modern technical solutions which allowed for an extension of their life span for another 50 years.

SLO

## NOVA SNAGA TS KRŠKO NEW POWER FOR SS KRŠKO

**SR** Timovi ENS-a rade na modernizaciji jedne od ključnih trafostanica u Sloveniji – TS Krško, preko koje je u elektroenergetski sistem priključena nuklearna elektrana Krško. Izgradili su novo 110 kV polje, a zamjeniče i kompletну sekundarnu opremu ove trafostanice.

**EN** ENS teams are working on a modernization of one of the key substations in Slovenia – SS Krško. Nuclear power plant Krško is connected to the electrical power system through this substation. A new 110 kV bay has been built and overall secondary substation equipment will be replaced.

# SWE

## NA NOVOM ZADATKU ZA ENERGETSKU STABILNOST ON A NEW MISSION TO PROVIDE ENERGY STABILITY

**SR** Od ovog proljeća učestvujemo u izgradnji tri nove 130 kV trafostanice na jugu Švedske. Riječ je o jednom projektu kojim su obuhvaćene trafostanice: Horn, Gullringen i Södra Vi. Ovaj projekt važan je za energetsku stabилност regije i pomoći će u zadovoljenju sve veće potražnje za energijom.

**EN** Since this spring, we have been actively participating in the construction of three new 130 kV substations in southern Sweden. This is one project that includes three substations: Horn, Gullringen and Södra Vi. The project is important for the energy stability of the region and will help satisfy an increasing demand for electrical power.

# MNE

## MONTAŽA SPECIJALNOG HTLS PROVODNIKA INSTALLATION OF A SPECIAL HTLS CONDUCTOR

**SR** Timove iz Divizije dalekovoda očekuje još jedan novi i zanimljiv projekat. U pitanju je zamjena postojećeg, HTLS provodnikom na dalekovodu 110 kV Podgorica 1-Perućica, čime će se postići značajno povećanje prenosne moći ovog dalekovoda.

**EN** Another interesting new project is before the Transmission Lines Division teams. The project implies a replacement of an existing conductor with an HTLS conductor on the 110 kV transmission line Podgorica 1-Perućica which will result in a significant increase in the transmission capacity of this transmission line.

# BiH

## U SLUŽBI NAPAJANJA UKC BANJALUKA SUPPLYING UCC BANJALUKA

**SR** Timovi naše kompanije početkom godine rekonstruisali su dvije trafostanice koje treba da osiguraju dugoročnu bezbjednost napajanja dvije klinike koje rade u sastavu Univerzitetskog kliničkog centra Banjaluka (UKC BL), najveće i najznačajnije javne zdravstvene ustanove u Republici Srpskoj.

**EN** Early this year, our company's teams reconstructed two substations which are intended to secure a long-term and safe power supply for the two clinics working within the University Clinical Center Banjaluka (UCC Banjaluka), the largest public health facility in the Republic of Srpska.

## NOVI INVESTICIONI CIKLUS ELEKTROPRENOSA BiH A NEW INVESTMENT CYCLE IN ELEKTROPRENOSS B&H

**SR** U drugoj polovini godine naši timovi započeli su radove na tri trafostanice. Naime, u pitanju je proširenje 110/x kV TS Srebrenica, rekonstrukcija 110/x kV TS Trebinje 1, te izgradnja 110/x kV TS Banjaluka 9. Završetak radova planiran je sredinom sljedeće godine.

**EN** In the second half of the year, our teams commenced their works on three substations. These activities imply the expansion of 110/x kV SS Srebrenica, reconstruction of 110/x kV SS Trebinje 1 and construction of 110/x kV SS Banjaluka 9. Works are planned to be completed by the middle of the next year.

# ELNOS TRADE - NOVA ČLANICA ELNOS GRUPE

ELNOS TRADE – A NEW MEMBER OF ELNOS GROUP



Prodajni centar Elnos Tradea u Istočnom Sarajevu Elnos Trade sales center in East Sarajevo

**ELNOS TRADE JE NOVA ČLANICA  
ELNOS GRUPE.** Kompanija je nasljednica sektora prodaje Elnosa BL Banjaluka i spremna je da zauzme jednu od vodećih pozicija u oblasti prodaje i distribucije elektromaterijala u regionu.

**ELNOS TRADE IS A NEW MEMBER  
OF ELNOS GROUP.** This company is the successor of sales sector of Elnos BL Banjaluka and is ready to take one of the leading positions in the region in the area of sales and distribution of electrical material.

**SR** Dugogodišnja liderска pozicija sektora prodaje robe Elnosa BL Banjaluka u BiH s početkom ove godine krunisana je na izvrstan način, jer je ovaj sektor prerastao u kompaniju Elnos Trade.

U poslednjih 26 godina sektor prodaje robe Elnosa BL Banjaluka ostvario je niz izvanrednih rezultata i zauzeo apsolutnu lidersku poziciju u polju prodaje i distribucije elektromaterijala na tržištu BiH. Sa ponudom više od 8.000 proizvoda vodećih domaćih, evropskih i svjetskih proizvođača godinama unazad sektor prodaje čuvao je nepriskosnovenu poziciju u kategoriji bogatstva assortimenta elektromaterijala u BiH.

Osnaženi kao nova kompanija, koja broji 57 vrhunskih profesionalaca, u Elnos Tradeu spremni su da nastave graditi reputaciju preduzeća koje premašuje zahtjeve i očekivanja kupaca.

„Elnos Trade je već lider na tržištu BiH, a mi očekujemo da ćemo se razviti u vodeću specijalizovanu kompaniju za prodaju i distribuciju elektromaterijala i u regionu. Mi smo kompanija koja je svjesna svoje pozicije, ali i pravca u kojem želimo da idemo. Trend našeg razvoja zavisi od brzine prilagođavanja promjenama i primjene inovativnih procesa. Planiramo širiti našu prodajnu mrežu i usmjeriti se na razvoj dugoročnih partnerstava sa našim komitetima. Zadovoljstvo korisnika daje nam motivaciju da uvodimo novi assortiman proizvoda, podižemo nivo usluga i izlazimo na nova tržišta“, istakla je Vlatka Dodik, direktor Elnos Tradea.

A liderска pozicija na tržištu čuva se primjenom visokih standarda poslovanja, kon-

stantnim praćenjem tržišnih trendova kroz ponudu novih proizvoda i brigu o zadovoljstvu klijenata.

### PRODAJNA MREŽA

U Elnos Tradeu posebno su ponosni na snažnu prodajnu mrežu, koja ima šest poslovnih centara, dva u Banjaluci i po jedan u Doboju, Bijeljini, Prijedoru i Istočnom Sarajevu. Kompanija takođe posjeduje i snažnu distributivnu mrežu u svim gradovima širom BiH.

Zahvaljujući ovako snažnoj mreži, Elnos Trade nastavlja da drži kurs odličnog poslovanja i da bilježi sve veći promet.

**EN** The leadership position that the sales sector of Elnos BL Banjaluka had been holding for years in B&H has been crowned in an extraordinary manner. This sector became a company of its own – Elnos Trade.

In the last 26 years, sales sector of Elnos BL Banjaluka has achieved a series of remarkable results and has taken a position of an absolute leader in the B&H market in domain of sales and distribution of electrical material. With offer including more than 8.000 products, produced by local, European and global companies, the sales sector of Elnos BL had for many years been the top most extensive seller of electrical material in B&H.

Strengthened as a new company, employing 57 highly proficient experts, Elnos Trade is ready to continue building the reputation of a company

that exceeds the demands and expectations of its clients.

“Elnos Trade is already a leader in the B&H market. We expect to become a leader in the region, a highly specialized company for sales and distribution of electrical material. As a company, we are aware of our position and the direction we intend to follow. Our growth trend depends on the speed of adjustment to the changes and application of innovative processes. It is our plan to expand our sales network and to focus on development of long-term partnerships with our clients. Customer satisfaction gives us motivation to introduce new products in our offer, to raise the level of the service and to enter new markets”, said Vlatka Dodik, Director of Elnos Trade.

Lead position in the market is maintained through adherence to high standards in business, continuous monitoring of new trends on the market and introduction of new products all leading to increased customer satisfaction.

### SALES NETWORK

At Elnos Trade, they are particularly proud of their strong sales network which includes six business centers, two in Banjaluka and one in Dobojski Breg, Bijeljina, Prijedor and East Sarajevo. The company also has a powerful distribution network in all cities in B&H.

Thanks to such a strong network, Elnos Trade firmly remains on the course of successful business development resulting in an ever increasing turnover of the company.



Lideri na tržištu BiH Leaders in the B&H market



### VLATKA DODIK

**Direktor Elnos Tradea**

Director of Elnos Trade

**SR** „U kontekstu budućeg razvoja istakla bih da su nesumnjivo naš najveći resurs zaposleni, koji su uvijek spremni svojim znanjem i iskustvom da savladaju sve nove tržišne zahtjeve. Pored toga, široka mreža poslovnih centara širom RS omogućava da svi komitenti i korisnici imaju na raspolaganju kvalitetne proizvode kao i fleksibilnu i ekspeditivnu logističku podršku.“

**EN** “In the context of future development, I would like to point out that our employees are, without any question, our most reliable resource. With their knowledge and experience, they are always ready to meet new challenges of the market. Moreover, a wide network of business centers throughout RS enables that all clients and customers always have at their disposal high-quality products accompanied by a flexible and expeditious logistic support.”



Distributivne trafostanice smo „skrojili po mjeri“ projekta HS2 Custom-made distribution substations for HS2 project

# NAJBOLJE OD NAS

BEST OF OURSELVES

**MODERNE DISTRIBUTIVNE TRAFOSTANICE KOJE SU TIMOVI ELNOS GRUPE I KOMPANIJE EMICO PROJEKTOVALI, IZRADILI I MONTIRALI ZA POTREBE PROJEKTA HIGH SPEED 2 (HS2) su jedinstvena distributivna postrojenja „krojena po mjeri“ ovog megaprojekta. Ovakve distributivne trafostanice su poseban proizvod, čijom izradom smo tržištu dali nešto najbolje do nas.**

**MODERN DISTRIBUTIVE SUBSTATIONS, DESIGNED, PRODUCED AND INSTALLED BY ELNOS AND EMICO TEAMS FOR PROJECT HIGH SPEED 2 (HS2) are indeed distinctive distribution plants, custom-made for the needs of this megaproject. These distribution stations are a unique product and we gave our best when we built them.**

**Za nas su distributivne trafostanice mnogo više od zbira njihovih SN ili NN postrojenja, prekidača i transformatora. Kada njihovu osnovnu funkciju znate prilagoditi nizu kompleksnih specifičnih zahtjeva projekta, onda možete reći da ste savladali poseban nivo inženjeringu.**

Poduhvat izgradnje HS2, ultrabrže željeznice u Velikoj Britaniji, otvorio nam je veliki splet zadataka na ovom planu.

Elnos Grupi povjeren je prestižan ugovor kojim su obuhvaćeni poslovi projektovanja, izrade, isporuke i instalacije 46 distributivnih trafostanica koje se stavljaju u službu napajanja tri gradilišta HS2 projekta – Vest Rajsli, Atlas Roud i Viktorija Roud Crosver Boks u sjeverozapadnom Londonu. Ove distributivne trafostanice su veoma specifična, prilagođena rješenja, projektovana u skladu sa

strogim britanskim standardima koji odgovaraju najnovijim potrebama tržišta. Poslovi koji su nam povjereni pri njihovoj izradi zahtjevaju posebnu kombinaciju inženjerske stručnosti, inovativnosti i profesionalnog pristupa. Tim Elnos Grupe i kompanije Emico, čiju su osnovnicu činile članice u Beogradu, Banjaluci i Londonu, spretno je prihvatio ovaj izazov.

## SJAJAN TIM ZA ORIGINALNA RJEŠENJA

Svaka od 46 trafostanica, koliko ih izradujemo u okviru ovog projekta, je elektroenergetski objekat „skrojen po mjeri“ projekta HS2.

Od projektovanja do montaže na gradilištima u Londonu, timovi Elnos Grupe položili su prav test znanja i inovativnosti na polju praktičnog rješavanja problema.

Tim Elnos Grupe, u saradnji sa Emico ekipom, projektovao je svaku distributivnu trafostanicu, timovi elektromontažnih radionica u Beogradu i Banjaluci su ih sklapali, dok je posebno poglavje ispisano u Londonu, gdje su ekipe montirale distributivne trafostanice.

Svaka distributivna trafostanica koju smo projektivali, izradili i montirali razlikuje se po opremi koju sadrži i predstavlja istinski proizvod za sebe. U svaku od njih ugradivali smo najbolja i najsavremenija rješenja, uklopljena po striktnim britanskim standardima.

Poštujući stroge tehničke zahtjeve, kreirali smo jedinstvena rješenja za instaliranje složene i savremene tehnologije koja je trebalo uklopiti u izuzetno mali prostor. Za ovaj dio posla koristili smo savremene softvere, koji su nam omogućili jednostavnije parametriranje, a samim tim i projektovanje.

Komponente za montažu dolazile su iz BiH, Srbije, Velike Britanije, Poljske, Italije i Francuske. U distributivne trafostanice instalirani su: transformatori, SN postrojenja, NN ormari, SCADA sistemi, šinski razvodi, HVAC sistemi za klimatizaciju i ventilaciju te elementi opštne elektroinstalacija.

Zahtjevnom britanskom tržištu dali smo proizvod za brze vozove budućnosti. Zato smo ponosni na uspješno projektovane, izrađene i montirane distributivne trafostanice od naponskog nivoa 11 kV/0,4 kV i snage 630 kVA do naponskog nivoa 11 kV/20 kV i snage 8 MVA, dužine od pet do dvanaest metara.

Ovaj projekt tražio je iskorak i pokazatelj je onog najboljeg od Elnos Grupe. Naša kompanija potvrdila je da je stručno osposobljena za kompleksnu djelatnost projektovanja, izrade i montaže distributivnih trafostanica za napajanje velikih gradilišnih mašina za bušenje tunela.

**EN** For us, distribution substations are more than just a sum of their LV and MV plants, switches and transformers. It is only when you can adapt the functions of these individual elements to meet a series of specific project demands that you can rightfully say you mastered a new level of engineering knowledge and skill.

The construction of HS2, the new high-speed railway in Great Britain, put a load of complex assignments on our table.

Elnos Group was given a prestigious contract to design, produce, deliver and install 46 distribution substations to provide a power supply for three construction sites of the HS2 project - West Ruislip, Atlas Road and Victoria Road Crossover Box, located in north west London. These distribution substations are highly specific, custom-made solutions, designed to comply with strict British standards corresponding to the latest market needs. The tasks assigned to us in terms of their production require a characteristic combination of engineering expertise, innovation and professional approach. Elnos Group and Emico team, backed by our Belgrade, Banjaluka and London members, accepted this challenge.

## AN OUTSTANDING TEAM FOR ORIGINAL SOLUTIONS

Each of the 46 substations we are producing within this project represents a custom-made power facility designed specifically for the needs of HS2.

From design to installation on construction sites in London, Elnos teams passed a true test of knowledge and innovation in practical problem solving.

Elnos Group team designed each substation in cooperation with Emico teams. Then, the substations were produced in our workshops in Belgrade and Banjaluka. The final and most memorable chapter was the installation of the substations in London.

Each of the substations we designed, produced and installed is different from the others, in terms of equipment installed within. Each substation is a unique product. Only the best state-of-the-art solutions were used in their production, and in compliance with strict British standards.

Very strict technical requirements were obeyed while creating these unique solutions for installation of complex technologies in a limited space. Modern software enabled a simpler determination of parameters which, again, made the design process easier.

Components to be installed arrived from Bosnia and Herzegovina, Croatia, Serbia, Great Britain, Poland, Italy and France. The following elements were installed in the distribution substations: transformers, MV plants, LV cabinets, SCADA systems, busbar trunking systems, HVAC systems for air conditioning and ventilation and other common electrical elements.

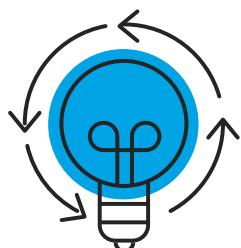
We made a product for the high-speed trains of the future for the demanding British market. For this reason, we are most proud of our successfully designed, produced and installed distribution substations with voltage levels ranging from 11 kV/0,4 kV to 11 kV/20 kV, power of 630 kVA to 8 MVA and a length of five to twelve meters.

This project demanded we step forward. It shows what we can deliver when we give our best. With this project, our company proved its professional capabilities for complex designing, production and installation of distribution substations to supply heavy-duty tunnel boring construction machinery.

EMR radionice ispunile niz zahtjeva  
EMW workshops meet a series of requirements



**Znanje i biznis**  
Knowledge and business



# Inovacijama do sigurnije budućnosti

INNOVATION FOR A SAFER FUTURE

**RAZVOJ I ULAGANJE** u obnovljive izvore energije  
su ključ rješenja za energetsku krizu.

**DEVELOPMENT AND INVESTMENT** in renewable energy  
sources are the key solution to energy crisis.

**SR ENERGETIKA BUDUĆNOSTI  
TRAŽI NOVA RJEŠENJA**

Tehnološka inovativnost, strategija i vizija za nove vidove ulaganja su najvažnija opcija za suočavanje s jednim od najaktuelnijih izazova energetike današnjice – prijetećom energetskom krizom, zaključeno je na ovogodišnjem Samitu energetike u Trebinju (SET Trebinje).

Borko Torbica, izvršni potpredsjednik Uprave Elnos Grupe, prilikom prezentacije Elnos Grupe na ovoj konferenciji istakao je da smo grupacija koja je godinama unazad akter projekata koji mijenjaju zelenu mapu regije i Evrope te da sa sigurnošću možemo donijeti najmodernija rješenja i inovacije i u BiH.

Elnos Grupa je treću godinu zaredom bila generalni sponzor samita u Trebinju, koji se tradicionalno održava u martu.

**EN ENERGETICS OF THE FUTURE  
SEARCHES FOR NEW SOLUTIONS**

Technological innovation, strategy and vision for new forms of investment are the firmest option for facing biggest challenge in energetics today – imminent energy crisis. This was a conclusion reached on this year's International Energy Summit in Trebinje (SET Trebinje).

During presentation of Elnos Group on this conference, Borko Torbica, Executive Vice President of the Group, pointed out that we are a company which has been taking proactive role in projects that changed green map of the region and Europe. As such, he added, we can certainly bring cutting-edge solutions and innovation to B&H.

For third year in a row, Elnos Group has been a general sponsor of the summit in Trebinje, which is traditionally held in March.



SET Trebinje  
Trebinje Energy Summit



Jahorina ekonomski forum  
Jahorina Economic Forum

## SR ŠTA NAM DONOSI ENERGETSKA TRANZICIJA?

Tranzicija energetskog sektora od fosilnih ka zelenim izvorima postavila je krupan zahtjev za ubrzavanje dinamike korištenja modernih tehnologija, jedna je od osnovnih poruka panela Elnos Grupe održanog u okviru petog Jahorina biznis foruma.

Marko Mijić, član Uprave Elnosa za tehničke poslove, naglasio je da se osjeća spremnost za promjene regulativa koje su do sada onemogućavale energetsku tranziciju te da Elnos Grupa sa nestrpljenjem čeka na pokretanje velikih OIE projekata na domaćem tržištu.

Ovogodišnji Jahorina ekonomski forum okupio je više od 400 domaćih i stranih privrednika, finansijskih stručnjaka, profesora te predstavnika diplomatskog kora.

## EN WHAT DOES ENERGY TRANSITION BRING US?

Transition of electrical energy sector from fossil towards green energy sources is a task which requires an accelerated use of modern technologies. This is one of most important messages of Elnos Group panel held on fifth Jahorina Business Forum.

Marko Mijić, Elnos Group Board Member for Technical Affairs, underlined that there is a readiness for changes in regulatory framework which has been disabling energy transition so far. He added that Elnos Group is eagerly expecting commencement of big RES projects on local market.

This year's Jahorina Economic Forum gathered more than 400 local and foreign businessmen, financial experts, professors and representatives of diplomatic core.

## SR NA „DANIMA DOBROG VJETRA“ U DUBROVNIKU

Energetska kriza dodatno je ubrzala proces energetske tranzicije i sve prepreke ovakvoj dinamici moraju biti uklonjene, istaknuto je na „Danima dobrog vjetra“ u Dubrovniku, konferenciji koja je u junu okupila više od 270 učesnika iz regije i Evrope.

Delegacija Elnos Grupe sa predstavnicima i učesnicima konferencije razmijenila je niz aktuelnih informacija iz sektora OIE, s akcentom na energiju iz vjetra.

Elnos Grupa je važan akter izgradnje velikih poduhvata iz oblasti vjetroenergije. Svoje umijeće u ovoj oblasti do sada smo pokazali u okviru poduhvata izgradnje vjetroparkova Čibuk 1 (158 MW) u Srbiji te Bogoslovec (36 MW) i Bogdanci (36,8 MW) u Sjevernoj Makedoniji, a trenutno su aktuelni naši radovi na izgradnji VP Krivača (103 MW) u Srbiji.



Dani dobrog vjetra u Dubrovniku  
Days of Good Wind in Dubrovnik

## EN ON “DAYS OF GOOD WIND” IN DUBROVNIK

Energy crisis additionally accelerated process of energy transition. All obstacles to this trend must be removed. These are the conclusions from "Days of Good Wind", a conference held in Dubrovnik, which gathered 270 participants from region and Europe.

Delegation of Elnos Group exchanged important and updated RES news and information with conference participants. The accent was placed on wind power.

Elnos Group is an active participant in major wind power projects. Thus far, we have demonstrated our skills in this segment through construction of wind parks Čibuk 1 (158 MW) in Serbia and Bogoslovec (36 MW) and Bogdanci (36.8 MW) in North Macedonia. Also, works on construction of wind park Krivača (103 MW) in Serbia are currently in progress.

## SR MOBILIZACIJA TEHNOLOGIJE ZA ČISTU ENERGIJU

Elnos Grupa bila je i premium gold sponsor Konferencije o obnovljivim izvorima energije „OIE Srbija 2022“, koja je održana u septembru u Beogradu. Naša kompanija ovom podrškom pokazala je opredijeljenost ka stvaranju što više uslova za ubrzavanje zelene energetske tranzicije.

Imajući u vidu stratešku namjeru Srbije da do 2040. godine proizvode minimalno 40 odsto električne i toplotne energije iz obnovljivih izvora, sa konferencije je poručeno da je neophodna jača mobilizacija tehnologije za čistu energiju da bi se obezbijedili postavljeni ciljevi koji podrazumijevaju nula neto emisije gasova.

## EN MOBILIZATION OF PURE ENERGY TECHNOLOGY

Elnos Group was a premium gold sponsor of Renewable Energy Sources Conference "RES Serbia 2022", which was held in Belgrade in September. Through this support, our company showed its determination to create conditions to accelerate transition to green energy.

Having in mind Serbia's strategic intention to produce minimum 40% of its electrical and thermal power from renewable sources by 2040, it was concluded on the conference that there is a need for stronger mobilization of pure energy technology in order to achieve the overall goal i.e. to reduce net gas emissions to zero.



Konferencija „OIE Srbija 2022“  
"RES Serbia 2022" conference



Na konferenciji CIRED Srbija On CIRED conference in Serbia



Ekipa Elnosa na savjetovanju „Energetika 2022“ Elnos team on “Energetics 2022” conference

# U korak sa trendovima

## Keeping up with trends

**ELNOS GRUPA I OVE GODINE USPJEŠNO SE PREDSTAVILA** na najvažnijim konferencijama iz oblasti energetike i distributivnih mreža, na kojima su brojni stručnjaci imali priliku da se upoznaju sa našim projektima.

**THIS YEAR, ELNOS GROUP SUCCESSFULLY INTRODUCED** itself on the most significant conferences in area of electrical engineering and distribution networks, where numerous experts had the opportunity to get acquainted with our projects.

### „ENERGETIKA 2022“ – IZAZOV I PRILICA

Više od 300 predstavnika Energetske zajednice iz osam zemalja ovog juna boravilo je na Zlatiboru, na 22. Međunarodnom savjetovanju „Energetika 2022“. Ovogodišnji fokus konferencije su dugoročni i kratkoročni izazovi energetske tranzicije u Srbiji. Naša kompanija uspješno se predstavila na ovom međunarodnom savjetovanju, u okviru kojeg je s ponosom preuzeila i ulogu velikog sponzora. Ovo je bila i prilika da podsjetimo da smo do sada kroz veliki broj regionalnih i evropskih OIE projekata učestvovali u izgradnji više od 500 megavata instaliranih kapaciteta, u oblastima hidroenergije, vjetroenergije i energije biomase.

### CIRED – DISTRIBUTIVNE MREŽE U FOKUSU

Elnos Grupa predstavila se na tradicionalnoj konferenciji o distributivnim mrežama električne energije CIRED, koja je u septembru održana na Kopaoniku, u Srbiji.

Ovogodišnji CIRED okupio je veliki broj stručnjaka iz Srbije i iz zemalja regiona koji se bave proizvodnjom i distribucijom električne energije. Kao uvek, CIRED je bio prilika za razmjenu iskustava i znanja iz oblasti elektrodistributivnih mreža, informacija o aktuelnim projektima i stručnim radovima. Naša kompanija bila je i sponzor ove značajne konferencije, a organizovali smo i prezentaciju na kojoj su predstavljeni neki od naših najznačajnijih projekata.

### MOTIVACIJA BUDUĆIM INŽENJERIMA

Elnos Grupa potpisala je sporazume o poslovno-tehničkoj saradnji s elektrotehničkim fakultetima u Banjaluci i Istočnom Sarajevu.

Sporazumi koje smo potpisali predstavljaju nastavak odlične saradnje sa ove dvije visokoškolske ustanove. Na ovaj način Elnos Grupa je još jednom potvrdila visok nivo društveno odgovornog angažmana u visokoškolskom obrazovanju.

Podržati obrazovanje mlađih kadrova je jedan od najboljih puteva u prosperitetnu budućnost, a novi sporazumi su važan temelj za realizaciju projekata obrazovanja budućih stručnjaka koji će u perspektivi biti ključni akteri razvoja elektroenergetike.



Poklon ETF-u Banjaluka A gift to FEE in Banjaluka

## POKLON ELNOS GRUPE ETF-У БАЊАЛУЦИ

Kao dokazani prijatelj Elektrotehničkog fakulteta Banjaluka Elnos Grupa je realizovala projekat adaptacije i modernizacije jedne od učionica ove visokoškolske ustanove. Bio je ovo poseban i kreativan projekat po čijem je završetku jedna od učionica ovog fakulteta zasjala sasvim novim sjajem.

Ove godine smo poseban vid naše podrške usmjerili i ka ETF-u u Beogradu, gdje je naša kompanija pomogla nabavku opreme za laboratoriju na ovom fakultetu.

Svjesni važnosti obrazovanja, spremni smo da kroz projekte poput ovih studentima obezbjeđujemo uslove za učenje i rad, jer je to jedan od preduslova da oni ostanu u zemlji i rade u domaćim firmama.

## EN "ENERGETICS 2022" – CHALLENGE AND OPPORTUNITY

More than 300 representatives of energy community, coming from eight different countries, took part in 22nd International Conference "Energetics 2022" held on Zlatibor in June. This year's conference was focused on long-term and short-term challenges of energy transition in Serbia. Our company made a successful presentation on this international conference. We were proud to have been given a chance to become one of major sponsors of the event.

This conference was also an opportunity to remind the community that, though a large number of regional and European RES projects, we have so far participated in construction of hydro, wind and biomass power facilities with total installed power of more than 500 MW.

## CIRED-DISTRIBUTIVE NETWORKS IN FOCUS

Elnos Group introduced itself on CIRED, a traditional conference on electrical power distributive networks, held in June, on Kopaonik, Serbia.

This year's CIRED gathered an enviable number of professionals from Serbia and region, which are in different ways engaged in production and distribution of electrical power. As always, CIRED was a great opportunity for its participants to share experiences and knowledge in area of power distribution, information on ongoing and planned projects and professional work done in the field. Our company sponsored this event. We also used this opportunity to organize a presentation of some of our most advantageous projects.

## MOTIVATION FOR FUTURE ENGINEERS

Elnos Group signed agreements on business and technical cooperation with Faculties of Electrical Engineering in Banjaluka and East Sarajevo. The agreements that we have signed represent

the continuation of excellent cooperation with these two higher education institutions. In this way, Elnos Group once again confirmed a high level of socially responsible engagement in terms of education.

Supporting the education of young personnel is one of the best ways to a prosperous future, and new agreements are foundation of education projects for future experts who will become key players in electrical engineering development.

## A GIFT FROM ELNOS GROUP TO FEE IN BANJALUKA

As a proven friend of the Faculty of Electrical Engineering, Banjaluka, Elnos Group implemented a project of adaptation and modernization one of the classrooms of this high education institution. This was a special and creative project, after which completion one of the classrooms of this faculty glow with a new splendor.

This year, we directed our support for the Faculty of Electrical Engineering in Belgrade, where our company helped in procurement of laboratory equipment at this faculty.

Being aware of the importance of education, through implementation of these and similar projects, we show our commitment to creating conditions for students to learn and work. That is a prerequisite for students involved to stay in the country and work in local companies.

# ZNANJE OTVARA VRATA BUDUĆNOSTI

KNOWLEDGE OPENS DOORS TO THE FUTURE

**GENERACIJAMA** koje žele pozitivne promjene u svijetu mjesto je u savremenoj energetici.

**GENERATIONS** eager for positive changes in the world belong to modern electrical engineering.



Ljetna praksa – jedinstvena prilika za sticanje znanja Summer practical training – a unique opportunity to gain knowledge

## **SR LJETNA PRAKSA VJETAR U LEĐA BUDUĆIM INŽENJERIMA**

Jedanaest studenata završnih godina elektrotehničkih fakulteta u Istočnom Sarajevu i Banjaluci u avgustu je uspješno završilo posebno kreiran program ljetne stručne prakse Elnos Grupe.

Studenti su se upoznali s načinom rada i modernim trendovima iz oblasti elektroenergetike na osam projekta naše kompanije i tako stekli značajno praktično iskustvo za njihovo buduće obrazovanje i profesionalno usmjerenje.

## **EN SUMMER PRACTICAL TRAINING AS WIND AT THE BACK OF FUTURE ENGINEERS**

In august this year, eleven final-year students of Faculties of Electrical Engineering in East Sarajevo and Banjaluka successfully completed a specially designed summer practical training at Elnos Group.

Through eight projects implemented by our company, the students got acquainted with our method of operating and modern trends in electrical power engineering. Thus, they acquired significant experience which will be important for their future education and professional orientation.



Novi stipendisti Elnosa  
New Elnos scholars



Edukacije u EMR-u  
Education in EMW



Monteri na obuci  
Linemen on training

## **SR MLADI SU STUB DIVIZIJE ZA DALEKOVODE**

S obzirom na to da su monteri dalekovoda deficitarni kada se na tržištu, Elnos Grupa od 2019. godine organizuje obuku za rad na visokonaponskim vodovima, koju je prošlo više od 80 polaznika.

Kandidati prvo prolaze teoretski dio edukacije o segmentima rada na gradilištu, počev od upoznavanja sa mehanizacijom, opremom i mašinama pa sve do montaže različitih vrsta dalekovodnih stubova, kao i o mjerama bezbjednosti.

Praktični dio obuke odvija se na poligonima na kojima polaznici obavljaju elektromontažne radove.

Elektromonteri koji uspješno polože sve dijelove obuke iz oblasti visokonaponskih vodova po njenom završetku dobijaju sertifikat Elnos Grupe o završenoj edukaciji za rad na visokonaponskim vodovima.

## **EN THE YOUNG ARE THE PILLAR OF TRANSMISSION LINES DIVISION**

Due to the constant deficit of linemen on the market, Elnos Group has been organizing a training program for works on high-voltage lines since 2019 more than 80 people went through this training.

Candidates first go through theoretical part of the training which is focused on different segments of works on the site, from introduction to the mechanization, equipment and machinery to assembly of different types of transmission line towers. Safety measures are also a part of the program.

Practical part of the training is performed on the training fields where the trainees perform electrical assembly works. Linemen who pass all segments of the high-voltage transmission line training get a certificate issued by Elnos Group on successfully completed training for work on high-voltage lines.

## **SR NOVA GENERACIJA STIPENDISTA**

Rađanjem nove generacije Elnosovih stipendista prijateljski odnos naše kompanije i elektrotehničkih fakulteta širom BiH je dosegao novi novo.

Naša kompanija je ove godine dodijelila stipendije za odabrane studente četvrtih godina osnovnih studija elektrotehničkih fakulteta u BiH.

Osim novčane podrške, program stipendiranja Elnos Grupe uključuje i posebno kreiran program mentorstva. Po završetku diplomskog rada studentima se otvara mogućnost obavljanja pripravničkog staža u Elnos Grupi.

## **EN A NEW GENERATION OF SCHOLARS**

With the birth of a new generation of Elnos' scholars, the friendly relationship between our company and electrical engineering faculties throughout Bosnia and Herzegovina has reached a new level.

This year, our company awarded scholarships to selected fourth-year students of electrical engineering faculties in Bosnia and Herzegovina.

In addition to financial support, the scholarship program of the Elnos Group includes a specially created mentorship program. Upon completion of the graduation thesis, students are given the opportunity to do an internship in the Elnos Group.

## **SR VELIKO INTERESOVANJE SREDNJOŠKOLACA ZA NAŠU PRAKSU**

U proteklih jedanaest godina praktičnu nastavu u elektromontažnoj radionici (EMR) naše kompanije u Banjaluci pohadalo je više od 250 srednjoškolaca Politehničke i Elektrotehničke škole.

Prakse u našoj elektromontažnoj radionici u Banjaluci i ove godine izazvale su veliko interesovanje učenika Politehničke i Elektrotehničke škole.

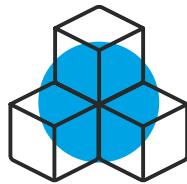
U našim radionicama u okviru svakodnevnog procesa rada učenici imaju mogućnost da svoje teoretsko znanje povežu s praktičnim iskustvom, a otvara im se i mogućnost zapošljenja u kompaniji po završetku školovanja.

## **EN HIGH INTEREST FOR OUR PRACTICAL TRAINING AMONG HIGH SCHOOL STUDENTS**

During previous eleven years, more than 250 students of Polytechnical High School and High School of Electrical Engineering took part in practical training in our company's electrical assembly workshop (EMW) in Banjaluka.

This year's practical training in our electrical assembly workshop in Banjaluka also raised a very high interest among students of Polytechnical High School and High School of Electrical Engineering.

While observing and participating in everyday activities in our workshops, students get the opportunity to combine their theoretical knowledge with practical experience. This training also enables potential employment in our company, upon completion of high school education.



Prijateljstvo  
**bez granica**  
 FRIENDSHIP WITHOUT LIMITS

**SR PRIJATELJI KULTURE**

Naša kompanija ove godine podržala je realizaciju postavke jedne posebne izložbe u Kulturnom centru Banski dvor u Banjaluci. U pitanju je izložba pod nazivom „Banovi Banjaluke“, koja je posjetioce vratila u period kada je grad na Vrbasu živio svoj procvat.

Obezbeđujući rasvjetu za prostor u instituciji koja je srce kulturne djelatnosti Banjaluke, sagrađenoj za vrijeme prvog bana, energičnog vizionara Svetislava Tise Milosavljevića, postali smo skroman dio nove kulturne tekovine koja oživljava sjajne vjekove iza nas.

**EN FRIENDS OF CULTURE**

Our company supported a very special exhibition organized in Banski Dvor Cultural Centre in Banjaluka. Name of the exhibition is "Banovi Banjaluke" (Governors of Banjaluka). It reminded its visitors of the time when city on Vrbas prospered remarkably for the first time in its history.

By providing lighting for the exhibition space in the institution which was constructed during the mandate of its first governor, a vibrant visionary Svetislav Tisa Milosavljević, and has come to be a centre of cultural activity in Banjaluka, we became a humble contributor to cultural heritage that casts a light on centuries passed.



Banski dvor Banjaluka Banski Dvor Cultural Center in Banjaluka

## PODRŠKA HORU „JEDINSTVO“

Mješoviti hor Srpskog pjevačkog društva „Jedinstvo“ iz Banjaluke ove godine obilježava 30. godišnjicu obnavljanja, a ujedno se i priprema da naredne godine obilježi 130 godina od osnivanja.

Tim povodom ovaj hor predstavio se na 42. Međunarodnom festivalu „St. Pauler kulturno ljeto 2022“ u Austriji, u okviru kojeg je održao cjelovečernji koncert. Imajući u vidu da je hor „Jedinstvo“ dio najznačajnijih kulturno-umjetničkih manifestacija u Republici Srpskoj i u svijetu te da je veliki ambasador Banjaluke, Elnos Grupa pomogla je njegov put u Austriju.



Hor „Jedinstvo“  
Choir „Jedinstvo“

## DONACIJE SLOVENAČKIM HEROJIMA

Prirodne katastrofe, ali i ljudski faktor više puta su nas podsjetili koliko je važno imati dobro vatrogasno društvo i ljudе koji će prvi, bez razmišljanja, reagovati i spasavati ljudske živote i imovinu. Vjerovali ili ne, vatrogasci Slovenije su najbrojnija dobrovoljna organizacija i bez konkurenциje posjeduju ogromno povjerenje i poštovanje građana ove zemlje. Sve su to razlozi koji su opredijelili i našu članicu ENS da najviše sponzorskih sredstava namijeni baš njima.

Dvije posljednje donacije otišle su u ruke dobrovoljnih vatrogasnih društava „Šitalič“ i „Pesje“. Inače, ponosni smo na angažman našeg vodećeg inženjera ENS-a Francija Milhara, koji je zamjenik komandira u Vatrogasnom društvu „Pesje“.



Podrška vatrogascima  
Support to the firefighters

## SLAVIMO S PRIJATELJIMA

Obilježavanje Nacionalnog dana Švedske u hotelu „Radisson Collection“ u Beogradu održano je 7. juna. To je bio važan datum i za Elnos Grupu. Među mnogobrojnim poslovnim zvanicama Elnos Grupa se izdvojila kao jedina domaća kompanija koja je napravila veliki uspjeh na tržištu Švedske.

Za 10 godina rada i više od 70 projekata iza nas, brojne nordijske kompanije Elnos Nordic i Elnos Grupu prepoznaju kao pouzdane i profesionalne partnerke.

U svjetlu decenije uspješnog poslovanja u Švedskoj, Elnos Grupa je sa zadovoljstvom podržala ovu svečanu manifestaciju.



Nacionalni dan Švedske  
Sweden's National Day

## SUPPORT TO CHOIR „JEDINSTVO“

This year, mixed choir of Serbian Choral Society „Jedinstvo“ from Banjaluka celebrates 30 years of its restoration. At the same time, the choir is preparing for celebration of 130 years of its foundation which will be organized next year.

Marking the occasion, the choir introduced itself on 42nd International Festival “St. Pauler Culture Summer” in Austria with an all-evening concert. Elnos Group decided to help the choir finance their trip to Austria, keeping in mind that choir „Jedinstvo“ is an indispensable component of cultural manifestations in Republic of Srpska and has, as such, become a great ambassador of Banjaluka.

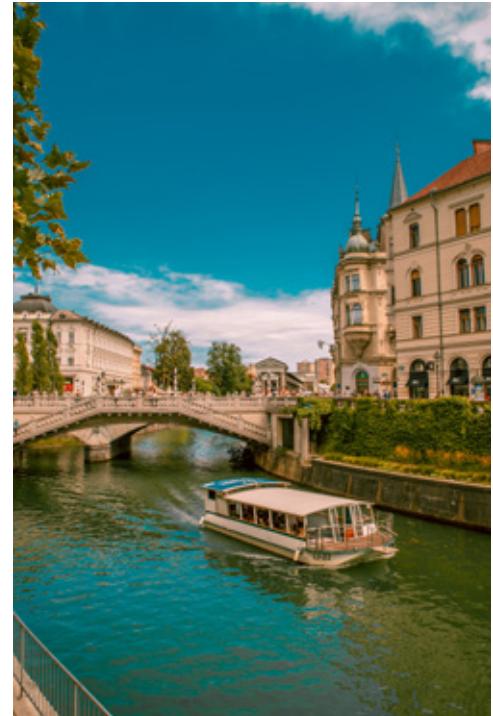
## DONATIONS TO HEROES IN SLOVENIA

Natural disasters and hazards caused by human factor have often reminded us of how important it is to have a reliable fire department and firemen who will be the first ones to respond, automatically, and save human lives and property. Believe it or not, firefighters form the most numerous voluntary organization in Slovenia. They enjoy the trust and respect of the citizens of their country with full right. For these reasons, our Member ENS decided to allocate majority of its sponsor funds precisely to this organization.

Two last donations were assigned to volunteer fire departments „Šitalič“ and „Pesje“. As a matter of fact, we are very proud of ENS Senior project engineer Franci Milhar's engagement as Deputy Commander in fire department „Pesje“.

## CELEBRATING WITH OUR FRIENDS

Celebration of Sweden's National Day was held in hotel “Radisson Collection” in Belgrade on June 7th. This was an important day for Elnos Group too. Among many guests coming from the world of business, Elnos Group was the only local company who achieved significant success in Swedish market. After 10 years and more than 70 completed projects, numerous Nordic companies now recognize Elnos Nordic and Elnos Grupa as reliable and professional partners.



**POPULACIJA:** 2.107.180

**GLAVNI GRAD:** Ljubljana

**JEZIK:** slovenački

**POPULATION:** 2.107.180

**CAPITAL:** Ljubljana

**LANGUAGE:** Slovenian

#### **SR ENERGETSKO TRŽIŠTE:**

Ciljevi energetske politike Slovenije za period od 2010. do 2030. godine su pouzdanost snabdijevanja energijom, ekološka održivost i borba protiv klimatskih promjena, konkurentnost prirede te društvena kohezivnost.

#### **ENS – NAŠA ČLANICA U SLOVENIJI:**

ENS Ljubljana prije pet godina počeo je s radom u okviru Elnos Grupe, a u tom kratkom periodu njegovi timovi uspješno su realizovali više od 360 projekata. Zaposleni u ENS-u su odlične kolege i prijatelji koji zajedno stvaraju priču o uspjehu. Zahvaljujući talentovanom timu inženjera i vođa projekata, u mogućnosti su da

realizuju projekte vrhunskog kvaliteta na vremenu i unutar budžeta.

#### **ZANIMLJIVOSTI:**

1. Ljubljana, ime glavnog grada, u prevodu znači „voljena osoba“ i proglašena je za najzeleniji grad Evrope 2016.
2. U Sloveniji ima više od 10.000 pećina.
3. Najstarije vino na svijetu, staro 400 godina, čuva se u Mariboru.
4. Najveća ski-skakaonica na svijetu nalazi se u Sloveniji i bila je mjesto na kojem je izvedeno čak 60 svjetski rekordnih skokova.
5. Slovenija je 2017. postigla nevjerojatnih 96 od 100 detaljnih indikatora održivosti.

#### **EN ENERGY MARKET:**

The goals of Slovenian energy policy for the period 2010 – 2030 are a reliable power supply, environmental sustainability and fight against climate change, competitiveness of economy and social cohesion.

#### **ENS – OUR SLOVENIAN MEMBER:**

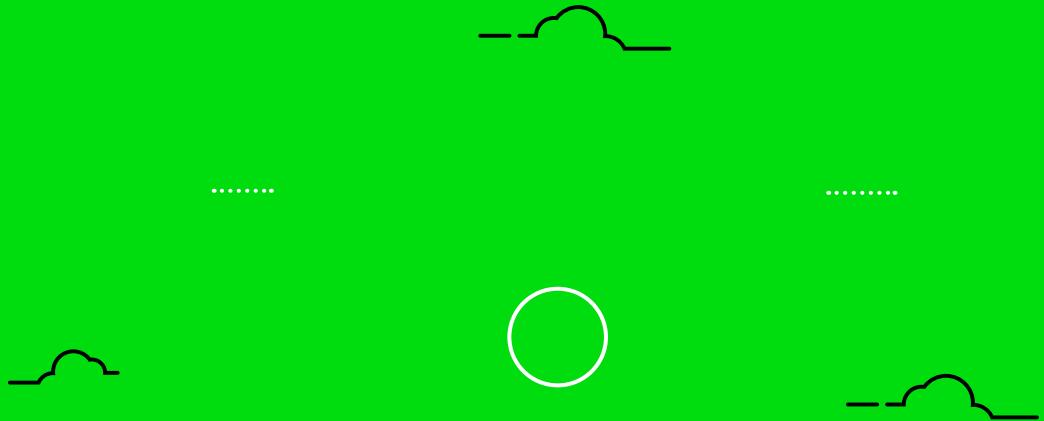
ENS Ljubljana became a part of Elnos Group five years ago. In this short time period, their teams managed to successfully complete more than 360 projects. ENS employees are excellent colleagues and friends. Together, they are writing the success story of this company. Thanks to its talented team of engineers, this company is capable to bring projects to a successful end in high quality manner and within the budget.

#### **FUN FACTS:**

1. Ljubljana, the name of the capital, means "beloved". The city was declared European Green Capital in 2016.
2. There are more than 10.000 caves in Slovenia.
3. The oldest wine in the world, with a confirmed age of more than 400 years, is kept in Maribor.
4. The world's largest ski jump is located in Slovenia and more than 60 world record jumps were done on it.
5. In 2017, Slovenia achieved an incredible 96 out of 100 detailed sustainability indicators.

220 KV DV Hólasandslína 3, Iceland  
Izgradnja dalekovoda nove generacije  
220 KV TL Hólasandslína 3, Iceland  
Construction of transmission line of new generation





## BUDUĆNOST JE SADA

THE FUTURE IS NOW

 Sr Svjetski klimatski izazovi nikada do sada nisu bili veći, a poruka nauke nikada jasnija – kao globalna zajednica moramo brzo i aktivno da djelujemo kako bismo sačuvali sutrašnjicu planete.

Elnos Grupa radi na svjetlijoj budućnosti za sve. Uvjereni smo da uz pomoć naših partnera možemo stvoriti nova radna mjesto, održivo energetsko okruženje i ekonomski rast.

 En Global climate challenges have never been bigger, and science has never been clearer in its response – as a global community, we must act instantly and actively as to preserve upcoming planet days.

Elnos Group strives to provide a brighter future for all. We remain convinced that, with the support of our partners, we can create new job opportunities, a sustainable power environment and economic growth.

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