

# info

**ELNOS**  
GROUP

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Naslovna tema Title theme:

**04 DOK VELIKI VULKAN SPAVA**  
WHILE A BIG VOLCANO SLEEPS

Ekspertiza Ekspertise:

**46 KAD ORGANIZACIJA**  
**POBIJEDI VISOKI RIZIK**  
WHEN ORGANIZATIONS  
BEATS HIGH RISK

Moderna infrastruktura Modern infrastructure:

**67 TRG SLAVIJA NOVI**  
**ORIJENTIR BEOGRADA**  
SLAVIJA SQUARE NEW  
BELGRADE LANDMARK

## ZVIJEZDA U USPONU

OBNOVLJIVI  
IZVORI  
ENERGIJE



**RISING  
STAR**  
RENEWABLE  
ENERGY  
SOURCES



Vjetropark Bogdanci, Makedonija

Izgradnja DV 110 kV Valandovo-Bogdanci za potrebe priključenja vjetroparka

Wind farm Bogdanci, Macedonia

Construction of TL 110 kV Valandovo-Bogdanci for connection of wind farm

# Riječ urednika

## Editors letter

**Rastuća potreba za energijom jedan je od najvećih izazova današnjice. Zarad obezbjedenja energetskih resursa budućnosti, svijet je ušao u energetsku tranziciju ka obnovljivim izvorima energije (OIE). Ovo je dugotrajan i kompleksan proces, čiji se napredak značajno ubrzava. Godine 2016. instalirano je rekordnih 161 gigawat-a novih obnovljivih izvora energije u svijetu, dok je u proteklih 12 godina Evropa udvostručila upotrebu energije iz obnovljivih izvora.**

**Elnos Grupa prati ovaj trend. Godinama smo posvećeni stvaranju energetske budućnosti, a kruna našeg angažmana upravo je dostignuta u 2017. godini. Sa rastućim brojem projekata iz najrazličitijih sfera oblasti OIE, potvrđili smo svoju ekspertizu od najsjevernijih dijelova Islanda do plodnih banatskih ravnica. Podjednak uspjeh ostvarili smo i u ostalim oblastima elektroenergetike, kao i na našim novim tržištima. Zbog toga, sa ponosom dijelimo sa vama priče o našim dostignućima i projektima koji će i u narednih 30-40 godina doprinosti ostvarenju klimatskih i ekonomskih ciljeva i održivosti modernog načina života.**

**Pred nama su brojni novi projekti i izazovi koje gledamo sa optimizmom, u svjetlu uspjeha koje realizujemo svakog dana, a koje želimo i u budućnosti dijeliti sa vama.**

*Ever increasing need for energy is one of the biggest challenges nowadays. In order to provide energy resources for future, the world entered energy transition leading to renewable energy sources (RES). Thus is long-lasting and complex process, whose improvement speeds up very fast. In 2016, record 161 Giga Watts of new renewable energy sources were installed in the world, whereas Europe doubled needs from renewable energy sources in the past 12 years.*

*Elnos Groups follows in this trend. For years, we have been devoted to creating energy future and the crown of our engagement actually was reached in 2017. Through increasing number of projects in different fields of RES, we affirmed our expertise starting from the far North Icelandic parts to fruitful Banat plains. We were equally successful in other fields of power engineering, as well as on our new markets. Due to this, we proudly present you stories on our achievements and projects to contribute reaching climate and economic goals and sustainability of modern lifestyle as far as for upcoming 30 or 40 years.*

*In front of us are numerous of new projects and challenges, which we look upon with optimism in the light of successes we perform every day, which we wish to share with you in future as well.*

**Uživajte čitajući,  
Enjoy reading,**

**MIRJANA ŠTRBAC**  
**Menadžer za korporativne komunikacije**  
Corporate Communications Manager



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# 10

**PROJEKAT SVJETSKIH OKVIRA  
ČIBUK 1 - VJETROPARK ZA ENERGETSKU  
BUDUĆNOST SRBIJE**

**THE PROJECT OF GLOBAL FRAMEWORK  
ČIBUK 1 - WIND FARM FOR SERBIA  
ENERGY FUTURE**

Elnos Grupa je ponosni dio projekta izgradnje najvećeg vjetroparka zapadnog Balkana, jedinstvenog poduhvata koji je spojio investitore i izvođače sa čak tri kontinenta.

Elnos Group is a proud part of the project of construction of the largest wind farm of the West Balkan, a unique venture that brought together investors and contractors from three continents.



# 27

**LIDERSTVO  
PRIVREDNIK GODINE**

**LEADERSHIP  
BUSINESSMAN OF THE YEAR**

Predsjedniku Uprave Elnos Grupe Dušanu Torbici uručena prestižna nagrada za najboljeg privrednika 2017. godine

President of the Board Elnos Group Dušan Torbica receive the prestigious award for the best businessman in 2017.

# 28

**MORE NOVIH MOGUĆNOSTI  
SLOVENIJA I NORVEŠKA  
U FOKUSU**

**A SEA OF NEW POSSIBILITIES  
SLOVENIA AND NORWAY  
IN FOCUS**

Iza nas je godina sve snažnije ekspanzije poslovanja na EU tržištu. Postali smo bogatiji za novu članicu u Sloveniji - kompaniju ENS i uspješno otvorili vrata novog, norveškog tržišta.

Behind us is the year, of stronger business expansion in the EU market. We have become richer for a new member of the Slovenia - ENS Company and we have successfully opened the door to a new, Norwegian market.



# 33

NOVE SNAGE  
**ONI SU MLADI  
INŽENJERI ELNOSA**

NEW FORCES  
**THEY ARE YOUNG  
ENGINEERS IN ELNOS**

Mladi tim inženjera Elnos Grupe je uspješno savladao prve velike zadatke i spremno očekuje nove izazove. Upoznaite ih u njihovom ozbilnjom, i nešto manje ozbilnjom izdanju.

The young team of engineers in Elnos Group has successfully completed the first major tasks and they are ready for new the challenges. Get to know them in their serious and somewhat less serious impression.



# 38

EKSTREMNI PODUHVAT  
**KAKO BITI LAV U  
POLJIMA LAVE?**

EXTREME VENTURE  
**HOW TO BE A LION IN  
THE LAVA FIELDS?**

Ovo je priča o jedinstvenom podvigu postavljanja 62 kilometra novih džinovskih dalekovoda u zemlji koju su Vikinzi zvali „prkosni kraj svijeta“.

This is the story of a unique venture setting up of 62 kilometers of new giant transmission lines in the land that the Vikings called “defiant end of the world”.



# 81

MARATONI I PUTOVANJA  
**BILJEŠKE O  
PRIJATELJSTVU**

MARATHONS AND JOURNEYS  
**NOTES ABOUT  
FRIENDSHIP**

Trčeci maratoni, putujući Mediteranom, uživajući na Jahorini i Jadranu zajedno smo prošli kroz nove avanture i ispričali nove zabavne priče o prijateljstvu koje traje.

Running the marathons, traveling the Mediterranean, enjoying on mountain Jahorina, at Adriatic Sea we went through a new adventures together and told new amusing stories about the friendship that lasts.



# DOK VELIKI VULKAN SPAVA

WHILE A BIG VOLCANO SLEEPS

**ISLAND JE SVJETSKI LIDER** u oblasti korištenja geotermalne energije, a Elnos Grupa je prošlog ljeta bila dio poduhvata koji se odvijao u okviru Krafla, najveće geotermalne elektrane ove zemlje, koja ponosno nosi ime velikog vulkana u čijoj blizini je izgrađena

**ICELAND IS A WORLD LEADER** in the field of using geothermal energy and, last summer, Elnos Group was a part of the project performed within Krafla, the biggest geothermal power plant of this country, which was proudly named after the big volcano, whose vicinity it was built in



**SR** Krafla je ime najpoznatijeg vulkana sjeverne islandske oblasti Myvatn. U njenoj neposrednoj blizini se nalazi najveća geotermalna elektrana Krafla, instalirane snage 60 MW. Duže od četiri decenije ova elektrana predstavlja jedan od najznačajnijih energetskih objekata koji uspješno odolijeva uslovima nemilosrdnog prirodnog okruženja.

Elnos Grupa je imala zadatak da obavi elektromontažne rade na novoj GIS 245/132/12 kV transformatorskoj stanici "Krafla 49". Cilj realizacije ovog projekta je obezbjedenje veze između 220 kV dalekovoda sa postojećom elektranom „Krafla 49“, a njegovo obavljanje je u konačnici stvorilo uslove za stabilniji plasman električne energije i proširenje proizvodnje geotermalne elektrane povezivanjem njenih novih proizvodnih kapaciteta na elektroenergetski sistem Islanda.

Timovi Elnos Grupe su u okviru projekta "Krafla 49", svoje zadatke obavljali u dvije faze.

Prva je podrazumijevala montažu GIS 220 kV postrojenja i pripadajućeg kompresorskog sistema, što je posao koji smo realizovali kao podizvodač kompanije „GE GRID“ iz Švajcarske. Montirano GIS postrojenje posjeduje dva dalekovodna, jedno trafo polje i jedno spojno polje sa proizvđnim sekcionisanjem sabirница.

Drugu fazu koja je podrazumijevala kompletne elektromontažne rade Elnos Grupa je izvršila samostalno. U okviru ove etape poslova naš tim je, između ostalog, ugradio

ormare zaštite i upravljanja, ćelije od 12 kV, zaštitno-upravljačke uređaje, AC/DC i SCADA ormare. Pored toga, montirali smo i dupli pod za koji je proizvođač izdao produženu petogodišnju garanciju, a zbog pozitivnih iskustava ranije uspješno izvedenih radova sa nama.

Tokom izvođenja projekta Elnos Grupa se našla pod pritiskom dva velika izazova. Jedan izazov je bio rad u izuzetno agresivnim prirodnim uslovima, dok je drugi predstavljao pritisak kratkog roka za obavljanje posla.

#### U INAT KOROZIJI

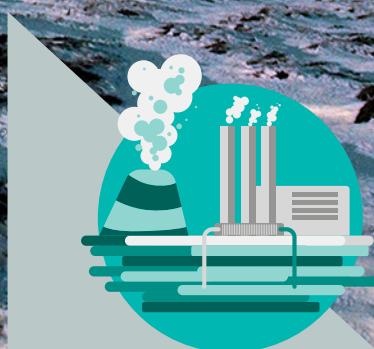
Uslovi visokokorozivne sredine, odnosno vazduha sa visokom koncentracijom sumpora su pred ekipu Elnos Grupe stavili dodatne zahtjeve za primjenu posebnih tehničkih rješenja kako bi se ugrađena oprema zaštitiла.

Upravo zbog ovakvih uslova sve metalne konstrukcije, oprema, kao i sav vijčani materijal su za ovaj projekat izrađeni u toplo-cinčanoj tehnologiji ili od nehrđajućeg čelika.

Unutar transformatorske stanice ugrađen je kompresorski sistem, čiji je zadatak da obezbijedi čist i filtriran vazduh za GIS opremu. U GIS pogón su ugrađeni energetski i komandno-signalni kablovi posebne izrade.

#### BORBA SA NEVREMENOM

Dio Islanda u kome se nalazi "Krafla 49" poznat je po gotovo neprestanim snježnim padavinama, niskim temperaturama i jakim vjetro-





GIS 245/132/12 kV postrojenje u TS "Krafla 49" GIS 245/132/12 kV facility in SS "Krafla 49"



vima. Samo u periodu od maja do septembra u ovoj regiji ne pada snijeg, ali zato snažni vjetrovi uvijek duvaju. Vazdušna udaljenost od najbližeg grada, Husavika, iznosi 45 kilometara.

Nepovoljni vremenski uslovi su otežali realizaciju radova na projektu, ali je tim Elnos Grupe na terenu uspio da se izbori sa svim preprekama, tako da je u konačnici izvršenja radova Elnos Grupa preuzela u svoje ruke i posao kompletog ispitivanja transformatorske stanice.

**EN** Krafla is the name of the best known volcano of Northern Icelandic area Myvatn. The biggest geothermal power plant Krafla with 60 MW of installed power is in its vicinity. For more than four decades, this power plant represents one of the most important power facilities successfully resisting conditions of harsh natural environment.

Elnos Group was tasked to perform electrical assembly works of the new GIS 245/132/12 kV substation "Krafla 49". The goal of this project is to secure the link between the 220 kV transmission line and the existing "Krafla 49" power plant, and its performance ultimately was created the conditions for a more stable placement of electricity and expansion of production of a geothermal power plant by conne-

cting its new production capacities to the electric power system at Iceland.

Within project "Krafla 49", Elnos Group teams performed their tasks in two phases.

The first phase included assembly of GIS 220 kV plant and appertaining compressor system, which we performed as subcontractor to the company "GE GRID" from Switzerland. Assembled GIS plant has two transmission lines, one substation and one connecting bay with diagonal sectioning of buses.

The second phase, which included entire electrical assembly works, Elnos Group completed itself. In this phase of project, among other activities, our team installed cabinets for protection and control, 12 kV cubicles, protection and control devices, AC/DC and SCADA cabinets. Apart from this, we also assembled a double floor, for which the producer issued extended five-year guarantee due to positive experience for previously performed works with us.

During project performance, Elnos Group was under pressure of two major challenges. One was work in very aggressive natural conditions, whereas the other one was a short deadline for works performance.

#### IN SPITE OF CORROSION

Circumstances of highly corrosive environ-

ment, i.e. air with high sulphur concentration face Elnos Group team with additional requests for application of special technical solutions in order to protect installed equipment.

For these reasons, all metal constructions, equipment, as well as all the screw products for this project were made by hot galvanized technology or from stainless iron.

Compressor system, whose task is to provide clean and filtrated air for GIS equipment, was installed inside substation. Electric power and command-signal cables, made in special way, were built in GIS facility.

#### FIGHT WITH WEATHER

A part of Iceland where "Krafla 49" is located in well-known for weather conditions whose main feature are constant snow falls, low temperatures and strong winds. It is not snowing only from May to September in this region, but strong winds are constant. Air distance to the closest town, Husavik, is 45 kilometers.

Unfavorable conditions aggravated works performance in this project, but Elnos Group team successfully faced all obstacles in the field but, in the field, Elnos Group managed to win in all the fights, so, at the end, Elnos Group undertook works on entire testing of the substation itself.



#### BURNA ISTORIJA KRAFLE TEMPESTUOUS HISTORY OF KRAFLA

Istoria nastanka geotermalne elektrane Krafla je bila burna, počevši od toga da je na samom početku zbog vulkanskih aktivnosti bilo ugroženo postojanje elektrane i to prije nego što je priključena na mrežu. Vulkanske erupcije koje su uslijedile u periodu od 1975. do 1984., uzrokovale su ulazak korozivno djelujućih para u geotermalni sistem, što je stvorilo mnogo problema. Uprkos teškoćama, prva turbina Krafla je priključena na mrežu 1978.

History of creating the geothermal power plant Krafla was tempestuous starting with the fact that, in the very beginning, due to volcanic activities, its existence had been jeopardized even before it was connected to the network. Volcanic eruptions following up in the period from 1975 to 1984 caused entrance of corrosive vapors in geothermal system, which caused many problems. Despite difficulties, the first turbine in Krafla was connected to the network in 1978.



#### SPECIFIČNOST GIS TRAFOSTANICE SPECIAL FEATURE OF GIS SUBSTATION

Tehnologija GIS rasklopnih postrojenja se primjenjuje na objektima na kojima nema mesta za vanjska rasklopna postrojenja i, generalno, na mjestima sa malo prostora. GIS postrojenja su posebna i zbog toga što su izolovana gasom SF<sub>6</sub>, a on posjeduje znatno bolje izolacione karakteristike koje čine transformatorsku stanicu mnogo manjom, kompaktnejom, ali i složenijom za samu izgradnju.

Technology of GIS switching facility is applied to the items where there is no place for outdoor switching facility and, generally, in locations with lack of space. GIS system is specific due to the fact it uses SF<sub>6</sub> gas as isolating medium and it has significantly better isolation characteristics, due to which this substation has significantly smaller dimensions, is more compact and more complex for construction.



#### OBARANJE SVJETSKOG REKORDA BEATING WORLD RECORD

Projektni tim koji je radio na Kraflji je prije četiri godine oborio svjetski rekord u vezi sa geotermalnom topotom, jer je uspio dobiti visokotemperaturnu paru na temperaturama od 450 stepeni Celzijusa, što je u ovom slučaju dovoljno za instaliranu snagu od 36 MW.

Project team working on Krafla beat world record for geothermal heat four years ago, since they managed to acquire high-temperature steam at 450 Celsius degrees, which, in this case, is enough to acquire installed 36 MW power.



Uspješno završen dvogodišnji poduhvat  
2 year endeavor successfully completed



Odlagač 12.000  
Spreader 12,000

# NAJSAVREMENIJA MAŠINA VELIKIH MOGUĆNOSTI

STATE OF THE ART MACHINE OF GREAT POSSIBILITIES

IZRADA NOVOG ODLAGAČA 12.000 je priča o  
novom, uzbudljivom razvoju energetskog  
rudarskog sektora u Srbiji

CONSTRUCTION OF NEW SPREADER 12.000 is a  
story about new, exciting development of  
electrical power and mining sector in Serbia

**SR** Najveći odlagač na kopovima EPS-a, Odlagač 12.000, počeo je sa radom u RB „Kolubara“. Elnos Grupa je s ponosom učestvovala u realizaciji dijela prvog 'zelenog' projekta u oblasti rudarstva u EPS-u. Bili smo podizvodčić kompanije FL Smitdh, a naš zajednički ugovor obuhvatao je projektovanje, nabavku, isporuku, ugradnju elektro opreme i puštanje u rad ovog odlagača.

„Vrijednost ove investicije je 18,8 miliona evra, a realizacija projekta je trajala oko dvije godine. Odlagač je projektovan da istovremeno prihvati i odlaže jalovinu sa sva tri bagera koji na 'Zapadnom polju' otkopavaju otkrivku, što će značajno unaprijediti proces proizvodnje jalovine“, rekao je Milorad Grčić, v. d. direktora JP EPS.

Izrada novog odlagača 12.000 je priča o novom, uzbudljivom razvoju energetskog rudarskog sektora u Srbiji. Sven Horškes, predsjednik kompanije FL Smitdh istakao je da je ovaj odlagač „posljednja riječ tehnike“ i da je u impresivnu rudarsku mašinu ugrađena najmodernija oprema, po svjetskim standardima. „Pred nama je najsavremenija mašina velikih mogućnosti, možda čak i u Evropi, na koju možete biti ponosni. Ispunjava stroge ekološke kriterijume i smenjeni su nivo buke i prašine“, istakao je Horškes.

Težina odlagača je 2.060 t, a dužina 130 m. Pored toga što je riječ o izuzetno moćnoj i masivnoj mašini, posebno je značajna njena potencijalna efikasnost. Naš zadatak je bio da ugradnjom elektro opreme udahnemo život ovoj moćnoj mašini, ukupne instalirane snage približno 5630 kW. „Tokom većeg dijela projekta na montaži je bilo uključeno preko 20, a često i preko 30 montera. Veći dio radova izvodio se na otvorenom i na velikoj visini, pa je posebna pažnja bila posvećena bezbjednosti i zaštiti na radu“, rekao je Stefan Golubović, projekt menadžer Elnos Grupe.

Sva elektro oprema smještena je u četiri kontejnera i dvije kabine za rukovaoca. Nadzorno-upravljački sistem kompletiran je najsavremenijom opremom koja je namijenjena za ovu vrstu industrije. Nadzor nad procesima ove mašine obavlja se pomoću PLC-a. Na mašini je ugrađeno preko 100 vrsta raznih senzora koji u velikoj mjeri automatizuju rad mašine. Odlagač se dijeli na četiri podgrupe ili tzv. gradnje, to su: gornja gradnja, donja gradnja, međutraka i klizni voz. Svaka od gradnji posjeduje svoj kontejner za smještaj elektro ormara, preko kojih se vrši napajanje pogona, a takođe ostvaruje i komandno-signalna veza sa opremom u polju.

Odlagač se kreće samostalno po kopu pomoću gusjenica, a napaja se pomoću 35 kV kabla i posjeduje na sebi modifikovanu trafostanicu. Preko ukupno četiri transformatora, prenosnih

odnosa 35/0,4 i 35/0,69 kV, napajaju se frekventno regulisani pogoni, kao i direktni pogoni na mašini. Odlagač je opremljen protivpožarnim sistemom, interfonima, telefonima, radio-vezom, video-nadzorom, a putem optičkog kabla povezana je sa dispečerskim centrom, gdje se mogu pratiti svi važni parametri njenog rada. „Na odlagaču je ukupno ugrađeno više od 200 svjetiljki i reflektora. Prvi put na našim industrijskim mašinama imamo LED tehnologiju, kojom smo željni da osavremenimo mašinu i pozitivno utičemo na uštedu energije“, istakao je Golubović.

Koristi od projekta biće brojne, prije svega RB „Kolubara“ će eksplorativati ugalj efikasnije i ekološki opravdanije. Krajnji ciljevi su čistiji vazduh zbog manjih emisija gasova i zagađujućih materija, kao i smanjenje habanja opreme i troškova održavanja.

**EN** The biggest spreader of the EPS cast mines, Spreader 12.000, started its operation at Mining Basin "Kolubara". Elnos Group proudly participated in realization of a part of the first 'green' project in the EPS mining area. We were subcontractor to company FL Smitdh, and our joint contract included design, purchase, delivery, installation of electrical equipment and commission of this spreader.

“Value of this investment amounts to 18.8 million Euro, and project realization lasted for two years. Spreader was designed to receive and deposit waste rock at the same time with all three excavators, which, on 'Zapadno polje' dig up overburden, which shall significantly improve waste rock production process”, said Milorad Grčić, Acting Director of Public Company EPS.

Construction of Spreader 12.000 is a story of new, exciting development of electrical power and mining sector in Serbia. Sven Horškes, President of the FL Smitdh company, said that this spreader is "state of the art" in technic sense and that latest equipment was installed in impressive mining machine, according to world standards. “We have the most modern machine with great capacities before us, maybe even in Europe, and you can be proud of it. It satisfied strict ecological criteria and level of noise and dust are decreased”, said Horškes.

Spreader weighs 2,060 t and is 130 m long. Apart from the fact this is powerful and massive machine, its capacity efficiency is extremely important. Our task was to breathe in life to this powerful machine by installing electrical equipment - total installed power is close to 5630 kW. “During most of the project, in assembly included over 20, and often more than 30 fitters.

Most of works were performed outdoors and on big heights, so special attention was paid to safety and protection at work”, said Stefan Golubović, Elnos Group Project Manager.

All electrical equipment is located in four containers and two cabins for operators. Supervision-controlling system has been equipped with the latest equipment intended for this type of industry. Supervision of this machine operation is performed through PLC. Over 100 types of various sensors were installed in the machine and these, in a great deal, automation operation of the machine. Spreader is divided in four subgroups or, so called structures, and those are: upper structure, lower structure, conveyer belt and sliding train. Each of structures has its own container for accommodating electrical cabinets, which are used for plant power supply, as well as controlling-signal connection with equipment on the field.

Spreader moves independently over the cast mine with crawlers and is powered by 35 kV cable and has a modified substation on it. Total of four transformers, transmission 35/0.4 and 35/0.69 kV, power frequently regulated drives, as well as direct drive of the machine. Spreader is equipped with firefighting system, interphones, telephones, radio-connection, video-surveillance, optical fibers connect it to dispatch center, where all the important parameters of its works could be monitored. “There are more than 200 lamps and headlights on the Spreader. For the first time, we have LED technology on our industrial mechanization, which helped us make the machine modern and to have a positive effect on energy”, said Golubović.

Project benefits shall be numerous and, in the first place, Mining Basin "Kolubara" shall exploit coal more efficiently and ecologically justified. The final goals are cleaner air due to smaller gas emissions and pollution substances, as well as decrease of equipment wearing and maintenance costs.



**IZGRADNJA VJETROPARKA ČIBUK 1 je najveći projekat te vrste na zapadnom Balkanu i najveća pojedinačna privatna investicija u Srbiju**

**CONSTRUCTION OF WIND FARM ČIBUK 1** is the biggest project of this kind on West Balkan and the biggest individual private investment in Serbia



# VJETAR U LEĐA

# ZELENOJ ENERGIJI SRBIJE

## WIND IN THE SAILS OF SERBIAN GREEN ENERGY

**SR** Poznato je da su vjetroparkovi potencijal srpske energetike. U jugoistočnom Banatu vjetrovi duvaju više od 200 dana u godini, dovoljnim intenzitetom za proizvodnju električne energije. Upravo je dobar potencijal vjetra u kombinaciji nekoliko povoljnijih faktora, kao što su mali ekološki rizici i povoljna infrastruktura, zaslužan za to što je područje Dolova izabrano za izgradnju najvećeg vjetroparka, ne samo u Srbiji, već i na zapadnom Balkanu. To je vjetropark Čibuk 1.

Elnos Grupa učestvuje u ovom velikom projektu koji će znatno ojačati srpski energetski sektor i popraviti bilans energije proizvedene iz obnovljivih izvora. Ministar rudarstva i energetike u Vladi Srbije Aleksandar Antić, ocijenio je da je ovo najveća pojedinačna privatna investicija u Srbiji. "Riječ je o velikom projektu za Banat i za Srbiju, o vjetroparku snage 158 megavata,

što je otprilike 32 procenta ukupnih naših projekata iz energije vjetra. Dobili smo projekat koji garantuje da će Srbija do 2020. godine povećati učešće obnovljivih izvora energije na 27 odsto naše ukupne potrošnje", rekao je Antić.

Vjetropark Čibuk 1 je sastavni dio Vetroelektrana Balkana, a gradi se na 50 kilometara od Beograda. U okviru ovog projekta, Elnos Grupa je partner General Electric-a. Naš dio posla obuhvata izgradnju 400/35 kV trafostanice Čibuk 1 i dvostrukog 400 kV dalekovoda dužine 11 km, po sistemu „ključ u ruke“. Odnosno, zaduženi smo za kompletan inženjeriranje i nabavku opreme za navedene energetske objekte, sa njihovim finalnim puštanjem u pogon. Način realizacije je baziran na FIDIC tipu ugovora, tzv. „Silver book“.

"U 2017. smo završili veći dio građevinskih radova, montažu prvog energetskog transformatora, montažu većeg dijela 400 kV opreme i prijemna ispitivanja kompletne opreme. Projekt se izvodi planiranim dinamikom, a sredinom jula 2018. je planirano puštanje objekta pod napon", rekao je Lazar Petrović, projekt menadžer Elnos Grupe.

Da je projekat jedinstven na ovim prostorima,

### O VJETROPARKU ČIBUK 1

VJETROPARK ČIBUK 1 PROSTIRAJE SE NA POVRŠINI OD OKO 40 KVADRATNIH KILOMETARA. OVAJ VJETROPARK ĆE IMATI 57 VJETROTURBINA, KOJE JE ISPORUČIO GENERAL ELECTRIC. OČEKUJE SE DA ĆE BITI PRIKLJUČEN NA MREŽU U PRVOJ POLOVINI 2019. GODINE I DA ĆE PROIZVODITI ELEKTRIČNU ENERGIJU ZA OKO 113.000 DOMAĆINSTAVA, ŠTO ĆE SMANJITI EMISIJE UGLJEN-DIOKSIDA ZA VIŠE OD 370.000 TONA.

### ABOUT WIND FARM ČIBUK 1

WIND FARM ČIBUK 1 SHALL COVER ABOUT 40 SQUARE KILOMETERS. THIS WIND FARM SHALL HAVE 57 WIND TURBINES DELIVERED FROM GENERAL ELECTRIC. IT IS EXPECTED TO BE CONNECTED TO THE NETWORK IN THE FIRST HALF 2019 AND PRODUCE ELECTRICAL POWER FOR ABOUT 113,000 HOUSEHOLDS, WHICH SHALL REDUCE CARBON-DIOXIDE EMISSION FOR MORE THAN 370,000 TONS.





Izgradnja TS 400/35 kV Čibuk 1 Construction of SS 400/35 kV Čibuk 1

dovoljno ilustruju sljedeći podaci. Njegova ukupna vrijednost je 220 miliona evra. Investitor je iz Ujedinjenih Arapskih Emirata, a glavni izvođač radova iz Amerike. Obim investicije, značaj projekta i veoma striktnе procedure, uslovljavaju sve učesnike na bespriječnosti profesionalizam. Za nas, u praksi, to znači posebne izazove, prije svega u projekt menadžmentu, a zatim i u svakodnevnim zadacima na gradilištu.

"U projekt menadžmentu je vrlo specifičan način finansiranja, a samim tim i fakturisanja. Kontrola je nesvakidašnje kompleksna, a interesantan podatak je da na izgradnji TS 400/35 kV, Elnos Grupa ima čak sedam nadzornih organa", rekao je Petrović.

I pored ovako kompleksnih procedura uspijevamo da održimo dinamiku u okviru ugovorenog rokova. Na projektu je angažovana naša velika ekipa koja broji 10 inženjera i 70-ak montera, a angažovali smo i nekoliko podizvodača. Svi su složni u stavu da je zaštita na radu rigorozna. Ističući da ne samo da se poštuju zakonske obaveze i procedure, već se radi po GE standardima koji su na znatno višem nivou od naše dosadašnje prakse.

Uslovi za očuvanje okoline, takođe su posebni. "Prilikom iskopa za temelje dalekovodnih stubova bili su prisutni predstavnici Pokrajinskog sekretarijata za zaštitu spomenika, te arheolozi, pošto je Dolovo poznato po rimskim zaostavština. Takođe, pri svim građevinskim radovima

koji uključuju betoniranje, vodi se računa o zaoštalu betonu iz miksera, koji se odlaže u rupe obložene najlonom, a koje su specijalno izrađene samo za te potrebe", dodaje Petrović.

I u 2018. godini nas očekuju brojni izazovi. Posebno će biti interesantno učešće u testovima priključenja vjetroparka na prenosni sistem Srbije, jer je to dio poslova koji do sada nismo imali priliku da radimo. Praktično, to će biti kruna i potvrda našeg kvalitetnog rada. Testiranje treba pokazati da je kompletan vjetropark sa priključkom (dakle 57 vjetrenjača, 35 kV kablovska mreža, TS 400/35 kV i DV 2x400 kV) projektovan i izведен u saglasnosti i u skladu sa pravilima rada prenosne mreže.

Veliki projekti obnovljivih izvora energije poput ovog, značajno utiču i na energetsku bezbjednost zemlje, jer umanjuju zavisnost od uvoza i fosilnih energetskih resursa. Vjetroelektrane ne emituju štetne gasove, pa će vjetropark Čibuk 1, osim energetske i ekonomske, znatno unaprijediti i ekološku sliku Srbije.

**EN** It is well-known that wind farms are capacity of Serbian electrical power. In South-East Banat, winds blow for more than 200 days in a year strong enough to produce electrical power. Good wind capacity combined with several favorable factors, such as small ecological risks and favorable infrastructure, are credited that area of Dolovo has been chosen for construction of

the biggest wind farm not only in Serbia, but also in West Balkan. We are talking about Wind Farm Čibuk 1.

Elnos Group participates in this big project that shall significantly strengthen Serbian electrical power sector and fix balance of energy produced from renewable sources. Aleksandar Antić, the Minister of Mining and Energy in the Government of the Republic of Serbia, said this is the biggest individual private investment in Serbia. "This is a big project for Banat and Serbia, wind farm of 158 megawatts, which is about 32 per cent of all our wind power projects in total. We got a project that guarantees that Serbia shall increase share of renewable sources to 27 per cent of our total consumption by 2020", said Antić.

Wind Farm Čibuk 1 is a constituent part of Balkan Wind Farms and is built at a location 50 kilometers away from Belgrade. In the frame of this project, Elnos Group is a partner to General Electric. Our part of works includes construction of 400/35 kV substation Čibuk 1 and double 400 kV transmission line 11 km long, per "turn-key" system. Namely, we are in charge of entire engineering and purchase of equipment for listed power facilities with their final commission. Way of realization is based on FIDIC type of contract, so called "Silver book".

"In the 2017, we have completed majority of construction works, installed the first power

transformer, assembling most of 400 kV equipment and acceptance testing of overall equipment. Project is being performed in planned time schedule and in mid-July 2018, it is planned to commission the facility on line", said Lazar Petrović, Elnos Group Project Manager.

Following information is enough to say that this project is a unique one in this region. Its total values amounts to 220 million Euro. Investor comes from the United Arab Emirates and the Main Contractor comes from America. Investment scope, project importance and very strict procedures condition all the participants to immaculate professionalism. Practically, those are special challenges for us, in project management in the first place, and then in everyday tasks on the site.

"Project management has a specific way of financing and hence invoicing is specific as well. Control is unusually complex and it is interesting that for construction of SS 400/35 kV Elnos Group has as many as seven supervisors", said Petrović.

Even with these complex procedures we manage to keep dynamics within contracted time deadlines. Our big team is engaged in this project. It has 10 engineers and about 70 fitters and we hired several sub-contractors. We all agree in the statement that protection at work is rigorous. Not only that we have to obey legal

obligations and procedures, but there are GE standards, which are on higher level than our practice so far.

Terms of protection of environment also are very special. "When digging the land for foundations of transmission line poles, representative from the Province Secretariat for protection of monuments and archeologists were present since Dolovo is well known for Roman remains. Likewise, in all construction works with concrete activities, we should pay attention to concrete remains in the mixer, which is deposited in holes covered in nylon, especially made for these purposes", adds Petrović.

We have numerous challenges in the 2018 as well. It will be very interesting to take part in testing of connecting wind farm to transmission system of Serbia since this part we have not had a chance to perform so far. Practically, this will be a crown and confirmation of our work. Testing should show that entire wind farm with connections (so 57 windmill, 35 kV of cable network, SS 400/35 kV and TL 2x400 kV) all designed and performed complying to and in line with the rules of transmission line work.

Big projects of renewable sources of energy, such as this one, have significant impact on power safety of a country, too, since they decrease dependency from import and fossil and fossil fuels. Wind power plants do not issue hazardous gases, so that Wind Farm Čibuk 1, apart from power and financial, shall improve ecological view of Serbia significantly.

#### **ENERGIJA VJETRA U SVIJETU**

KINA JE SVJETSKI LIDER KADA JE RJEĆ O POTENCIJALIMA ENERGIJE VJETRA, A PRATE JE SAD, NJEMAČKA I ŠPANIJA. ENERGIJA VJETRA JE VEOMA ZASTUPLJENA I U EVROPI, GDJE PREDNJAČI NJEMAČKA SA 29.060 MW ELEKTRIČNE ENERGIJE DOBIJENE IZ OVOG IZVORA.

#### **WIND POWER IN THE WORLD**

CHINA IS A WORLD LEADER WHEN TALKING ABOUT CAPACITIES OF THE WIND POWER AND IS FOLLOWED BY THE USA, GERMANY AND SPAIN. WIND POWER IS VERY MUCH PRESENT IN EUROPE AS WELL, WHERE GERMANY IS THE LEADER WITH 29,060 MW OF ELECTRICAL POWER GAINED FROM THIS SOURCE.



**Radovi teku planiranim dinamikom** Works are being executed in accordance with time schedule adopted





**ODGOVORAN PRISTUP KORIŠTENJU PRIRODNIH  
IZVORA ENERGIJE** *Banjaluku stavlja u rang  
evropskih gradova koji su odabrali sistem  
ekološkog i pametnog grijanja*

**RESPONSIBLE APPROACH OF USING NATURAL  
SOURCES OF ENERGY** *sets Banja Luka in the line  
with European cities choosing system of ecological  
and smart heating*

# GRAD KAO TOPAO EKO-DOM

## CITY AS WARM ECO-HOME

**SR** Ugodnost modernog života je bazirana na velikom sistemu "nevidljivih" instalacija, čije postojanje i rad veoma često uzimamo "zdravo za gotovo". Većina nas ne razmišlja o cijevima ispod naših radijatora, o postrojenjima za proizvodnju toplotne energije, a kamoli o tome iz koje energetske osnove toplane minuse iz naših domova pretvaraju u pluseve.

Ipak, onda kada nastane greška u sistemu, kada stanovi usred zime postanu mlaki ili još gore hladni, tada dojučerašnja stavka "zdravo za gotovo" postaje razlog za ozbiljnu zabrinutost.

Veliki broj Banjalučana može veoma slikovito posvjedočiti o ovoj neugodnosti. Znajući da sistem rada stare toplane godinama ne funkcioniše kako treba, većina njih je od kraja ljeta razmišljala kako da grijе stanove ove zime?

Problem grijanja grada je zahtijevao brzo i efikasno rješenje, koje je ubrzo i ponuđeno. Nove gradske vlasti su u okviru investitorskog partnerstva sa kompanijom IEE ovog ljeta ušle u najveći gradski infrastrukturni projekt decenije. Počela je izgradnja banjalučke Eko-toplane na drvnu sjećku, jednog od najvećih postrojenja ovog tipa u Evropi.

**EN** Comfort of modern life is based on big system of "invisible" installations, whose existence and work we often take for "granted". Most of us do not think about pipes under our radiators, or plants for producing thermal energy and not to talk about energetic base of how heating plants turn minuses of our homes into pluses.

However, once the error occurs in the system, when apartments become almost cold during winter, or, even worse, cold, that is when recently mentioned issue taken for "granted" becomes reason for being worried.

A big number of people in Banja Luka can talk about this unpleasant situation vividly. Knowing that the operating system of old heating plant has not been functioning properly for years, most of them was speculating as early as in summer how to get their apartment warm this winter?

Problem of heating the city demanded fast and efficient solution, which was soon offered. In the frame of investment partnership with company IEE, new city authority started the biggest infrastructural project of the decade. Construction of Banja Luka eco-heating plant fueled by chopped wood started, one of the biggest plants of this type in Europe, started.



**BIOMASA**  
**BIOMASS**

**BORKO TORBICA**

**predsjednik uprave IEE-a i projekt menadžer projekta Eko-toplana**  
President of the Management in IEE and Project Manager of the Eco-heating plant project

Značaj projekta izgradnje toplane na biomasu za Banjaluku je višestruk. Prvenstveno za lokalnu zajednicu, koja će na godišnjem nivou imati neto uštedu od više od deset miliona maraka, koje je do ove godine ulagala u mazut”, ističe Torbica.

On objašnjava da je Energetska zajednica Evropske unije definisala pojam energetske suverenosti grada kroz tri faktora, a koje toplana na biomasu u potpunosti ispunjava. Nova toplana će lokalnoj zajednici osigurati energetsku bezbjednost, samoodrživost i finansijsku sigurnost”, rekao je on, pojasnivši da će jedinstven projekat Eko-toplane smanjiti  $\text{CO}_2$  zagađenje životne sredine na području grada Banjaluka za 70.000 tona godišnje.

“Importance of project for constructing heating plan fueled by biomass is numerous for Banja Luka. In the first place, local community shall have net saving of more than ten million BAM on annual level, which have been invested in heating oil up to this year”, states Torbica. He explains that Energy Community of the European Union defined the term of energetic sovereignty of the city through three factors and biomass heating plant fulfills these completely. New heating plant shall provide local community with energetic safety, self-sustainability and financial safety”, he said and explained that unique project of the Eco-heating plant would decrease  $\text{CO}_2$  pollution of the environment in Banja Luka City area for 70,000 tons annually.

## GRAĐEVINSKI RADOVI

IEE je započeo realizaciju jedinstvenog projekta inteligentnog grijanja grada, a svi građevinski i elektro radovi povjereni su ekipama Elnos Grupe. Izgradnja Eko-toplane instalirane snage 49 MW je počela u junu, u neposrednoj blizini stare toplane.

Za mladu inženjerku građevine Anu Ković, izgradnja Eko-toplane je bila veliki izazov u karijeri. Ona je obavljajući funkciju glavnog i odgovornog koordinatora rukovodila svim građevinskim radovima u okviru ovog jedinstvenog projekta.

Slušajući njene utiske sa gradilišta, brzo vam postaje jasno u kojoj mjeri su građevinski radovi na ovom projektu bili specifični.

„U glavnoj temeljnoj ploči smo napravili mnoštvo kanala za instalaciju kotlovske i elevatorske opreme, elektroenergetskih kablova i motor reduktora. Zajedno sa iskusnim kolegama smo zahtjeve ovog projekta rješavali strpljivo, korak po korak. Mislim da smo na ovom projektu zaista pokazali da smo efikasan, praktičan i dobar tim”, kaže Ković.

Ekipe Elnosa su od početka ljeta do kraja jeseni uspješno izvršile sve predviđene građevinske poslove. Radovi su, pored izrade glavnog temelja, osnove 30,9x84,75 metara, podrazumijevali i izgradnju većeg broja temelja za: silos drvne sječke, administrativni objekat, filtere, te ventilatore dimnjaka.

U okviru građevinske faze projekta izgradili smo i veoma praktična i sigurna rješenja za jednostavno nadgledanje i lak pristup opremi u pogonima.

## ELEKTRO RADOVI

Tim Elnosa je izvršio i poslove elektroinstalacije jake i slabe struje u objektima nove Eko-toplane, kao i u njenoj blizini.

Radovi elektroinstalacija jake struje su obuhvatili izradu instalacija za opštu rasvjetu, kao i napajanje svih tehničkih potrošača. Ekipe Elnosa su ugradile i LED rasvjetu, te razvodne ormare renomiranih proizvođača.

Elektro faza projekta je podrazumijevala i postavljanje instalacija, video-nadzora, računarske mreže i vatrodojava, izradu zidane transformatorice 10(20)/0,4 kV; 2x1250 kVA i agregat 400 kVA.

## CONSTRUCTION WORKS

IEE started realization of unique project for intelligent heating of the city and all construction and electrical works were entrusted to Elnos Group teams. Construction of new Eco-heating plant, which has installed power of 49 MW, started in June in the immediate vicinity of old heating plant.

For young construction engineer Ana Ković, construction of the Eco-heating plant was a big challenge in carrier. She managed all construction works being the head and responsible Coordinator of this unique project.

While listening to her impressions from the site, soon you become clear that construction works of this project were specific.

“We made numerous installation channels for boiler and elevator equipment, electrical power cables and motor reducer in the main foundation plate. Along with experienced colleagues, we dealt with requirements of this project patiently, step by step. I believe this is an example for us to prove we are efficient, practical and good team”, says Ković.

From the beginning of summer to the end of autumn, Elnos teams successfully performed all planned construction works. Apart from constructing the main foundation base 30.9x84.75 meters, works also included construction of numerous foundations for the following: silos for chopped wood, administrative facility, filters as well as chimney ventilators.

In the frame of construction phase of the project, we made very practical and safe solutions for simple supervision and easy approach to equipment in plants.

## ELECTRICAL WORKS

Elnos team also performed works on electrical installations of high and low current in the facilities of the new Eco-heating plant itself as well as in its vicinity.

High current electrical power works covered installations for general lighting as well as power supply for all technological consumers. Elnos teams installed LED lighting and distribution cabinets of renowned producers.

Electrical phase of the project also included and setting installation for video-surveillance, IT network and fire alarm, constructed build substation 10(20)/0.4 kV; 2x1250 kVA and generator 400 kVA.



Eko-toplane Banjaluka  
Eco-heating plant Banja Luka



U pogone Eko-toplane ugrađena jedinstvena i praktična rješenja  
Unique and practical solutions applied in Eco-heating plant

"Ekološke studije jasno potvrđuju da je emisija štetnih čestica prilikom grijanja na biomasu mnogo manja, a stvaranje toplotne energije za grijanje iz drvne sječke znači da će se ona kupovati od domaćih drvoradivača, što znači da novac ostaje na ovom području", rekao je Igor Radojičić, gradonačelnik Banjaluke i dodaо da će realizacija ovog projekta riješiti najveći finansijski i komunalni problem grada.

"Ecological studies clearly confirm that issue of hazardous particles during biomass heating was significantly smaller and producing energy from chopped wood means that it would be purchased from domestic wood processors, which again means the money shall stay locally", said Igor Radojičić, Banja Luka Mayor and added that Realization of the project Eco-heating plant Banja Luka shall solve the biggest financial and municipal problem of the city.



**Snaga**  
Power

**49**  
MW

**Pogoni**  
Plants

**10**

kotlova tip GHS W 5000  
snage po 4,9 MW  
boilers type GHS W 5000  
power 4.9 MW each

**Prerada**  
Processing

**80.0000**

tona drvne  
sječke godišnje  
tons of chopped  
wood a year

**Konzum**  
Consumers

**20.0000**

korisnika i 1.350.000 m<sup>2</sup>  
grijnog prostora  
users and 1,350,000 m<sup>2</sup>  
of heated area

**IGOR RADOJIČIĆ**

gradonačelnik Banjaluke  
Banja Luka Mayor

TRANZICIJA PREMA

# OBNOVLJIVIM IZVORIMA ENERGIJE

TRANSITION TOWARDS  
RENEWABLE ENERGY SOURCES

**SR** Srbija je energetski nezavisnija od većine zemalja Evropske unije. Primjera radi, godine 2013. držala je zavidno četvrtu mjesto na ovoj skali, odmah iza Rumunije, Danske i Estonije. Za privrednu, socijalnu i stratešku poziciju ove, kao i svih zemalja, strateški je značajan visok nivo energetske sigurnosti. Ovaj veliki izazov u prvi plan stavlja pitanje termopotencijala i hidropotencijala u ukupnom učešću u proizvodnji energije. Nažalost, ovaj odnos nije pozitivan, jer je više od 60 odsto proizvodnje iz termopotencijala, a više od 30 odsto iz hidropotencijala. Kada uzmemo u obzir da je dominantan emergent ugljen, lignit, veliki zagađivač čije zalihe polako nestaju, a da bogat hidropotencijal nije dovoljno iskorišten, lako zaključujemo koliko je za ovu zemlju važna tranzicija prema obnovljivim izvorima energije.

Elnos Grupa godinama daje značajan doprinos

na putu ove tranzicije, a 2017. godinu obilježilo je učešće u dva dugoročna kapitalna projekta u oblasti hidroenergije. To su revitalizacije hidroelektrane Zvornik i sedam malih hidroelektrana u Zapadnoj Srbiji.

**EN** In the sense of energy, Serbia is more independent than most of countries in the European Union. For example, in 2013, it was on excellent 4th position of this scale, just after Romania, Denmark and Estonia. For economic, social and strategic position of this, as well as other countries, high level of energetic security is of strategic importance. In the first place, this big challenge puts an issue of thermal capacity and hydro capacity in total participation in power production. Unfortunately, this ratio is not positive, since more than 60 percent of the production comes from thermal capacity and more than 30 per cent is from hydro capacity. If we take into account that coal, lignite, is a dominant fuel, a big polluter whose reserves vanish slowly, and that rich hydro capacity has not been used enough, it is easy to conclude how important for this country is to transit for renewable energy sources.

Elnos Group has been significantly contributing the road of this transition for years, and 2017 was marked with participation in two long-term capital projects in hydro-power field. Those are revitalizations of Hydro-Power Plant Zvornik and of seven small hydro-power plants in West Serbia.



HIDROENERGIJA  
HYDRO ENERGY



O

E

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**BENEFITI PROJEKTA**

PO ZAVRŠETKU PROJEKTA HE ZVORNIK ĆE BITI NAJSAVREMENIJA HIDROELEKTRANA U SRBIJI I U REGIONU. PREDVIDENO JE DA NAKON REVITALIZACIJE SVA ČETIRI AGREGATA, SNAGA HE ZVORNIK BUDUĆE POVEĆANA ZA 30 ODSTO, NA 125,6 MW. RADNI VIJEK HIDROELEKTRANE PRODUŽIĆE SE ZA NOVIH 30 DO 40 GODINA.

**POSAO ELNOS GRUPE**

INVESTITOR PROJEKTA JE ELEKTROPRIVREDA SRBIJE, GLAVNI IZVODAČ RADOVA VOITH HYDRO, A ELNOS GRUPA JE NA ČELU BROJNE DOMAĆE OPERATIVE. NAŠ POSAO NA REVITALIZACIJI OBUVATAVA: ČETIRI AGREGATA I TS 110 KV, PROJEKTOVANJE I IZVOĐENJE ELEKTROMAŠINSKOG DIJELA, ISPORUKU I PUŠTANJE U RAD ZAŠTITNO-UPRAVLJAČKIH UREDAJA I SISTEMA.

MHE "Pod gradom" u Užicu  
MHPP "Pod gradom" in Užice



## **SR REVITALIZACIJA HE ZVORNIK**

**KRUNA DVOGODIŠnjEG RADA** na ovom projektu je još jedan, drugi, revitalizovani agregat, A2. Njegova uspješna sinhronizacija na mrežu elektroenergetskog sistema završena je 21. novembra, tačno u 14.49 časova. Tad je označen zavrsetak veoma kompleksnog posla. Agregat je od sredine decembra bio u probnom radu, koji je trajao 30 dana.

**JEDNOGODIŠnJA FAZA PROJEKTA** protekla je veoma dobro. Mijodrag Čitaković, zamjenik direktora inženjeringu u Elnosu Srbija ističe: „Iskustvo stečeno na revitalizaciji prvog agregata neprocjenljivo je u smislu pripremnih radova, organizacije, izvođenja, primjene zaštitnih mjera. Zbog toga su neki radovi izvođeni brže i kvalitetnije, a ovim smo i mi bliže svom cilju da postignemo savršenu organizaciju. Ekipa su uhodane, iza sebe imaju iskustvo i to se vidjelo po tempu izvođenja radova“.

**SVAKI AGREGATIMA SVOJE SPECIFIČNOSTI**, pa je tako i ovaj agregat projekat za sebe. Moralo se voditi računa o svakom detalju, kako bi se ispunili veoma strogi zahtjevi iz tendera. Čitaković ističe: „Nikad nije sve identično na licu mjesta kod svih agregata. Uspjeh zavisi od ispunjava-

nja proceduralnih zahtjeva, a mi imamo pripremljene i uhodane procedure za montažu svakog sklopa. Iznenadenja može biti samo kod uklapanja u postojeći prostor, stoga su naši stručnjaci veoma dobro obučeni i spremni da i najsloženije tehnološke postupke odraduju sa lakoćom. U cijeloj priči najvažniji nam je čovjek i o njemu se maksimalno vodi računa.“

## **PODMLAĐIVANJE 100-GODIŠnJIH POSTROJENJA**

**DUGA ISTORIJA** mini-hidroelektrana u Zapadnoj Srbiji dobila je novo poglavlje. U avgustu 2017. su startovali radovi na revitalizaciji MHE Seljašnica, čime je počeo kapitalni projekat revitalizacije sedam MHE u ovoj oblasti. Najstarija među ovim je MHE "Pod gradom" u Užicu, koja spada u najstarije očuvane hidroelektrane na svijetu, a puštena je u rad davne 1900. godine. Nosilac posla je Elnos Grupa u konzorcijumu sa kompanijom KOSSLER GMBH & Co KG, a u projektu učestvuju i brojni domaći podizvođači.

**VELIKO ANGAŽOVANJE** uloženo je i prije izlaska na teren, jer je EPS, kao investitor, preduzeo niz neophodnih mjera kako bi izvođenje radova bilo bezbjedno za ljude i opremu. To su kompleksne pripreme, koje umnogome otežava to što

Revitalizovani agregat A2 pušten u rad  
Revitalized generator A2 put into operation



ovi objekti već nekoliko godina nisu u funkciji, nema zaposlenih koji su tu radili, pa je na svakom koraku vrebala neka nepoznаница. Ovi problemi su uspješno prevaziđeni i radovi su počeli na tri MHE: Seljašnica, Turica i Kratovska reka. **SVAKA MHE JE SPECIFIČNA** i zahtijeva posebnu pripremu, kako projektanata tako i izvođača. „Mnogo se vremena utrošilo na projektovanje i iznalaženje optimalnih rješenja. Problem, kada je u pitanju ovaj posao, bio je taj što se ticao revitalizacije malih elektrana, a predviđena projektna rješenja su kao za elektrane preko 30 MW. Inženjeri svih kompanija ulažu maksimalne napore da se projektuje i proizvede najkvalitetnija oprema”, rekao je Mijodrag Čitaković, zamjenik direktora inženjeringu u Elnosu Srbija.

**BROJNI IZAZOVI** su bili pred ekipama na terenu, jer je revitalizacija mnogo kompleksniji posao od izgradnje novih MHE. Takve situacije se rješavaju praktično na dnevnom nivou, pa je na sve tri navedene MHE završen dobar dio građevinskih radova i demontaža stare opreme, a na Turici i Seljašnici urađena je i montaža turbine. Najteže je izvršiti uklapanje, jer se kod revitalizacija neki dijelovi zadržavaju, a samo se vrši njihova popravka. U nekadašnje 100-godišnje bisere tehnike ugradujemo najsvremeniju sofisticiranu opremu, softvere i najkvalitetnije materijale, i to je zaista veliki izazov.

**ZLATA VRIJEDNI KILOVATI** proizvodiće se u ovim centralama, jer je to čista energija i kao takva dragocjena za ovaj kraj. Rekonstrukcijom MHE uvećaće se proizvodni kapaciteti elektrana, steći njihova pouzdanost u radu, smanjiti troškovi održavanja, popraviti elektroenergetska situacija i broj kWh dobijenih iz obnovljivih izvora energije. „Šta ima radosnije od darovanja novog života, a ovo se može poistovjetiti sa tim, jer dajemo novu snagu MHE i one će ‘živjeti’ najmanje narednih 50 godina”, zaključio je Čitaković.

## EN REVITALIZATION OF HPP ZVORNIK

**CROWN OF TWO-YEAR WORK** of this project is another - the second, revitalized generator, A2. Its successful synchronization to the network of electrical power system was completed on November 21 at exactly 14:49 hrs. This is when completion of very complex work was signaled. From mid-December, the generator was started test operation and it lasted for 30 days.

**ONE-YEAR PHASE OF THE PROJECT** went very well. Mijodrag Čitaković, Deputy Director of the Engineering in Elnos Serbia, says that: “Experience acquired on revitalization of the first generator is priceless in the sense of preparation works,

organization, performance, application of protective measures. Due to this, some works were performed faster and in a better quality, and this brought us closer to our goal to achieve perfect organization. Teams are well-established with a lot of experience and this was evident in works performance tempo”.

**EACH GENERATOR HAS ITS SPECIFIC FEATURES**, so this generator is a special project as well. We had to pay attention to each detail in order to meet very strict tender requirements. Čitaković says: “It never is all identical at the very spot for all generators. Success depends on following in procedural requirements and we have prepared and already established procedures for mounting each circuit. There could be surprise only in setting to the existing space. Due to this, our professionals are very well trained and ready to perform the most complex technological procedures easily. In entire story, the most important is the human and this is what we take maximum care of.”

## REJUVENATION OF 100-YEARS-OLD PLANTS

**LONG HISTORY** of mini hydro-power plants in West Serbia got its new chapter. In August 2017, works on revitalization of MHPP Seljašnica started, which started capital project of revitalizing seven MHPPs in this region. The oldest is MHPP “Pod gradom” in Užice. It is one of the oldest preserved hydro-power plants in the world and its commission goes as far as in 1900. Leader is Elnos Group in consortium with company KOSSLER GMBH & Co KG, and numerous national and international contractors take place.

**BIG EFFORT** had been put even before we hit the field, since EPS, being the investor, undertook a series of necessary measures in order to have works safe both for people and equipment. Those are complex preparations that are aggravated by the fact these facilities have not been functioning for years now, there are no employees who used to work there, so there was always something new for us. These troubles were overcome successfully and works started in three MHPPs: Seljašnica, Turica and Kratovska reka.

**EACH MHPP IS SPECIFIC** and demands special preparation of both designers and contractors. “We spent a lot of time on design and finding optimal solutions. In these works, problem is those are small plants revitalization, and anticipated design solutions were made for plants over 30 MW. Engineers from all the companies put maximum effort to design and produce the

best quality equipment”, said Mijodrag Čitaković, Deputy Director of Elnos Serbia Engineering.

**NUMEROUS CHALLENGES** were facing the field teams since revitalization is more complex than building completely new MHPP. In practice, these situations are solved on daily basis, so in all three mentioned MHPPs a great deal of construction works and dismantling of old equipment was performed. In Turica and Seljašnica turbine was mounted as well. Setting up the equipment is the most difficult part because in revitalization some parts are kept and only their repair is done. Most modern sophisticated equipment, software and best quality materials are being built in 100-years-old technical pearls and this really is big challenge.

**GOLDEN KILOWATTS** shall be produced in these plants since this is pure power and hence valuable for this region. Reconstruction of MHPP shall increase production capacity of plants, their reliability in work shall be acquired, maintenance costs shall be reduced, electrical power situation shall be improved and number of kWh shall result from renewable energy sources. “What is more joyful than presenting a new life and this could be compared to this because we give new power to MHPPs and these shall ‘live’ at least for another 50 years”, concluded Čitaković.

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## PROJECT BENEFITS

ONCE COMPLETED, HPP ZVORNIK SHALL BE THE MOST MODERN HYDRO-POWER PLANT IN SERBIA AND REGIONALLY. AFTER REVITALIZATION, IT IS ANTICIPATED THAT, WITH ALL FOUR GENERATORS, HPP ZVORNIK POWER IS GOING TO BE INCREASED FOR 30 PER CENT – TO 125.6 MW. WORKING LIFE OF HYDRO-POWER PLANT SHALL BE EXPENDED FOR ANOTHER 30 TO 40 YEARS.

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## ELNOS GROUP WORK

ELEKTROPRIVREDNA SRBIJE – PROJECT INVESTOR; VOITH HYDRO – THE MAIN CONTRACTOR; ELNOS GROUP – HEAD OF NUMEROUS DOMESTIC COMPANIES. OUR REVITALIZATION PROJECT COVERS: FOUR GENERATORS AND SS 110 KV, DESIGN AND PERFORMANCE OF ELECTRICAL-MECHANICAL PART, DELIVERY AND COMMISSIONING OF PROTECTION AND CONTROL DEVICES AND SYSTEM.

# Logistički poduhvat za pamćenje

## Logistic endeavor to remember

**Kompleksnost dopremanja opreme za MHE Bočac 2 je još jedna u nizu potvrda da je izgradnja ove hidroelektrane jedan od najzahtjevnijih i najatraktivnijih projekata u kojima učestvuje Elnos Grupa**

*Complexity of providing equipment for MHPP Bočac 2 is another confirmation that construction of this hydro-power plant is one of the most demanding and most attractive projects Elnos Group takes part in*



Teret težio više od 50 tona  
Transported freight exceeded 50 tons

**SR** Ne dogada se često da procedura transporta, istovara i skladištenja opreme u svoj logistički lanac poveže tako veliki broj operacija i izvršilaca, kao što je to bio slučaj kod isporuke kaptalne hidromontažinske i elektromehaničke opreme za izgradnju mini-hidroelektrane Bočac 2.

Riječ je o jedinstvenom logističkom poduhvatu u okviru koga je teret na čak sedam vozila kategorisan kao specijalni, jer su njegove dimenzije prelazile širinu od 4,6 m, visinu od 4,5 m, a težina tereta je bila veća od 50 t.

Sedmodnevnom transportu ove opreme iz Francuske i Španije uspješno su prethodile višemjesečne pripreme. Prije svega, isporuci su prethodili fabrički prijemi opreme, zatim proces kompletiranja dokumentacije kontrole kvaliteta i dokumentacije izvedenog stanja. Koliko je zaista obimna oprema u pitanju, dobro ilustruje podatak da je samo njena ambalaža u konačnici bila teška blizu 20 t.

Da se radi o istinskom poduhvatu govori i činjenica da je konvoj vozila sa standardnim i specijalnim teretom krenuo ka krajnjem odredištu-MHE Bočac 2, tek nakon što su završeni vrlo zahtjevni procesi snimanja pristupnih puteva, te konsultacija sa transportnim kompanijama za prevoz specijalnih tereta.

Pravi zaplet poduhvata se ipak desio pred nje-

gov sam finiš. Sva vozila su do Hidroelektrane Bočac morala proći kroz vijugavi i opasni kanjon Vrbasa. Tuneli u kanjonu su dosta uski, pa je pred vozačima kamiona koji su prevozili specijalni teret bio veoma rizičan i težak zadatak da teret prevezu kroz tunele koji su samo malo širi od tereta koji voze. I ova prepreka uspješno je savladana.

Podsjećamo da je izgradnja MHE Bočac 2 prvi poduhvat ovog tipa na kojem Elnos Grupa predvodi kompletну elektromontažinsku i hidromehaničku fazu, čiji najzahtjevniji dio počinje u februaru 2018. godine.

**EN** It not often a case that procedure of transport, unloading and storage of equipment connects such a big number of operations and contractors in its logistic chain as it was a case with delivery of capital hydro-mechanical and electro-mechanical equipment for construction of MHPP Bočac 2.

This is a unique logistic endeavor where load on seven vehicles was categorized as special since its dimensions were over 4.6 m wide, 4.5 m high and weighed more than 50 t.

Preparations of many months successfully preceded this seven-day transport of the equipment from France and Spain. First of all, factory acceptance of the equipment, process of com-

pleting documentation for quality control and as-built-in documentation preceded. In order to describe the volume of equipment, information that their packages weighed almost 20 tons at the end speaks for itself.

Just to confirm this is a true endeavor, we will mentioned the fact that convoy of vehicles with standard and special load started towards the end point - Mini-Hydro Power Plant Bočac 2 – only after completing very demanding processes of surveying approaching roads as well as consulting with transport companies for transferring special loads.

However, the first plot of the project happened at the very final. To get to the Hydro-Power Plant Bočac, all the vehicles had to go through curvy and dangerous Vrbas Canyon. Tunnels of the Canyon are very narrow, so truck drivers of special load had a very risky and difficult task to transfer the load through tunnels a bit wider than the loads they were carrying. This obstacle was successfully overcome, too.

We would like to remind that Mini-hydro power plant Bočac 2 is the first project of this type where Elnos Group leads entire electrical-mechanical and hydro-mechanical phase whose most demanding part starts in February 2018.

# Solarna elektrana na krovu banke

## Solar power plant on the roof of a bank



Postavljeni 200 polikristalnih PV panela  
200 solar PV panels installed

**SR** Nekadašnja priča energetske budućnosti postala je stvarnost, jer se obnovljivi izvori energije sve više koriste u investicionoj izgradnji Srbije. Jedna od kompanija koja je među prvima odlučila da iskoristi energiju sunca za stvaranje električne energije i napravi iskorak na ovom polju je banka Societe Generale.

Ova finansijska institucija je ušla u investiciju izgradnje solarne elektrane na krovu svoje nove poslovnice u Beogradu, a za glavnog ugovarača na ovom projektu je izabrala Elnos BL Beograd.

Kao jedan od inovatora i predvodnika u oblasti obnovljivih izvora energije, Elnos BL Beograd je sa entuzijazmom prihvatio projekat izgradnje ove solarne elektrane, snage 56 kW i planirane godišnje proizvodnje 68.000 kWh.

Za izgradnju elektrane je, u skladu sa konfiguracijom krova i konstrukcijom samog objekta banke, projektovano i realizovano rješenje kojim je omogućena maksimalna efikasnost solarne elektrane, tako što je cjelokupan sistem PV (photo-voltaic) panela, putem čelične potkonstrukcije, podignut na istu visinsku kotu (od 21 metar).

Kako bi se osigurala trajnost i efikasnost rješenja ove solarne elektrane, osnovna konstrukcija je izgrađena od izdržljivih materijala, otpornih na širok spektar vremenskih uslova. Upravo zbog toga je noseća konstrukcija izrađena od

čelika, dok su profili koji nose panele izrađeni od aluminijuma.

Elnos BL Beograd je na ovom projektu konfigurisao sistem od 200 komada polikristalnih PV panela tipa REC 280 TP Twin Peak i invertora proizvođača KACO new energy.

Profesionalno posmatrano, jedna od posebnosti koje je ovaj posao donio za nas je nadovezivanje na postojeći objekat, što predstavlja potpuno drugačiji pristup procesu projektovanja u odnosu na neke naše ranije poslove ovog tipa. Ipak, projektantski tim Elnosa BL Beograd je prilagodio dizajnersko rješenje lokaciji i konstrukciji objekta banke, tako da arhitektura zgrade nije narušena.

**EN** One-time story on electrical power future became reality because renewable energy sources are used in investment construction of Serbia more and more. One of the companies which were the first to decide to use solar power for production of electrical power and make a step out in this field is the Bank Societe Generale.

This financial institution entered in investment of constructing solar plant on the roof of its new branch office in Belgrade and it selected Elnos BL Beograd to be the Main Contractor of the works. Being one of innovators and leaders of renewable energy sources, Elnos BL Beograd enthusiastically

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**Banka Societe Generale, među prvima u Srbiji ušla u projekat izgradnje solarne elektrane na krovu svoje zgrade. Kao glavnog ugovarača radova za ovaj posao je odabrala Elnos BL Beograd**

*Bank Societe Generale was one of the first in Serbia to start a project of constructing solar power plant on the roof of its building. It selected Elnos BL Beograd to be the Main Contractor of the works*

ily accepted the project of constructing this solar plant of 56 kW power and 68,000 kWh planned annual production.

In order to construct the plant, in line with roof configuration and construction of the bank building, we designed and realized a solution to provide maximum efficiency of solar power plant in the way that overall PV (photo-voltaic) system of panels was erected to the same height (21 meter) by steel sub-construction.

In order to ensure durability and efficiency of the solution, basic construction was constructed from durable materials resistant to wide spectrum of weather conditions. Due to this, bearing construction was made of steel, whereas profiles carrying panels are made out of aluminum. In this project, Elnos BL Beograd configured system of 200 pieces of poly-crystal PV panels REC 280 TP Twin Peak type and invertor produced by KACO new energy.

Professionally, one of specific features of this job was linking to the already existing facility, which represents a completely new approach to designing process compared to some of our previous jobs of this type. However, designing team from Elnos BL Beograd adapted design solution to the location and structure of the bank building, so that building architecture was not jeopardized.

# PROIZVODI ZA VRIJEME “ZELENE ENERGIJE”

Products for the period of “green energy”

*Elektromontažna radionica Beograd je tokom prethodne godine potvrdila spremnost za učešće u velikim projektima iz oblasti obnovljivih izvora energije*

*Last year, Electrical installation workshop Belgrade confirmed its readiness to participate in big projects in the field of renewable energy sources*



**EMR Beograd spretno ispunila niz zahtjeva**  
EIW Belgrade efficiently fulfilled a series of requirements

## SR PRVI PROJEKAT OBNOVLJIVIH IZVORA ENERGIJE U RUDARSTVU

Elektromontažna radionica Beograd je u proteklom vremenu radila 'punom parom', kako bi postigla dobre uspjehe na polju proizvodnje i ugradnje ormara zaštite i upravljanja, i u uslovinama povećanog obima tržišnih zahtjeva.

Jedan od ključnih projekata za EMR Beograd je bila proizvodnja i ugradnja ormara zaštite i upravljanja za projekat Odlagač 12.000 na površinskom kopu rudnika Kolubara, prvom 'zelenom' projektu u oblasti ruderstva Elektroprivrede Srbija.

EMR Beograd je za Odlagač 12.000 na kopu Kolubara proizvela i montirala 40 ormara zaštite, koji zbog svoje izuzetne kompleksnosti izrade u odnosu na standardne proizvode predstavljaju ponos radionice.

"Potrudili smo se da ispoštujemo specifične projektne zahtjeve investitora, koji su se odnosili na samu izradu ormara, ugradnju fleksibilnih

sabirničkih veza i sl. U ormare automatike smo ugrađivali PLC-ove renomiranih proizvođača, a posebno smo ponosni na to što smo u kratkom roku izvršili vrlo kompleksno ožičenje", rekao je Lazar Zelenović, direktor proizvodnje.

Na površinskom kopu Kolubara EMR Beograd izveo je radove montaže i sastavljanja ormara zaštite i upravljanja.

Radom na ovom projektu EMR Beograd je potvrdila da veoma spretno ispunjava zahtjeve na projektima 'zelene' energije i da postaje sve aktivniji učesnik u ovoj oblasti.

## VRHUNSKI PROIZVODI ZA HIDROENERGIJU

Pored učešća u 'zelenom' projektu Odlagač 12.000, EMR Beograd potvrđuje kvalitet svog rada i proizvodnjom u hidroenergetskoj oblasti polja obnovljivih izvora energije.

Radionica trenutno proizvodi i isporučuje ormare zaštite i upravljanja za hidroelektranu Zvornik i za projekat rekonstrukcije sedam sta-

rih mini-hidroelektrana na teritoriji zapadne Srbije.

Jedna od značajnijih referenci u oblasti hidroenergije su i ormari proizvedeni za projekat rekonstrukcije hidroelektrane "Perućica".

## VJETROELEKTRANE KAO NOVI IZAZOV

Elnos Grupa učestvuje u izgradnji vjetroparka Čibuk 1, najvećeg kapitalnog projekta ovog tipa u Srbiji i na zapadnom Balkanu. U okviru ovog poduhvata, EMR Beograd će napraviti proizvodni iskorak na još jednom polju 'zelene' energije.

"Obnovljivi izvori energije su sadašnjost i budućnost elektroenergetike, a mi svojim radom nastojimo da se pozicioniramo kao jedna od vodećih kompanija u tom domenu. Smatram da će naš rad na projektu izgradnje vjetroparka Čibuk 1, biti još jedna potvrda naše efikasnosti na polju obnovljivih izvora energije", rekao je Zelenović.

## EN FIRST PROJECT OF RENEWABLE ENERGY SOURCES IN MINING

Electrical installation workshop Belgrade worked 'full steam' in previous period in order to achieve good results in the area of production and installation of protection and control cabinets, even in conditions of increased market demand situation.

One of key projects for EIW Belgrade was production and installation of protection and control cabinets for project titled Spreader 12.000 of cast mine in the Mining Basin Kolubara, the first 'green' project in the mining field of Elektroprivreda Srbija.

EIW Belgrade produced and assembled 40 protection cabinets for Spreader 12.000 at the Mining Basin Kolubara, which, due to its extremely complex production compared to standard products, represent pride of the workshop.

"We tried to respect specific requirements by Investor referring to the production of cabinets themselves, installation of flexible busbar con-

nctions etc. PLC produced by renowned producers were installed in automatic cabinets, and we are especially proud to have completed very complex wiring in a very short deadline ", said Lazar Zelenović, production director.

EIW Belgrade was performed works on mounting and assembling protection and control cabinets at the cast mine in the Mining Basin Kolubara.

Working in this project, EIW Belgrade confirmed that it is ready to meet requirements of 'green' energy projects and that it is becoming even more active participant in this area.

## TOP PRODUCTS FOR HYDRO POWER

Apart from participation in 'green' project Spreader 12.000, EIW Belgrade validates the quality of its work through production in hydro power field of renewable energy sources.

At the moment, workshop produces and delivers protection and control cabinets for Hydro-

Power Plant Zvornik and for the project of reconstructing seven old mini hydro-power plants of West Serbia.

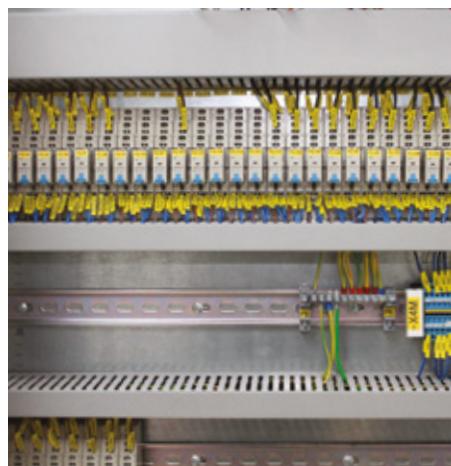
One of the imoprtant reference in a fields of hydroenergy are production cabinets for project of reconstruction Hydro -Power Plant "Perućica".

## WIND-POWER PLANTS AS A NEW CHALLENGE

Elnos Group participates in construction of Wind Farm Čibuk 1, the biggest capital project of this kind in Serbia and Western Balkan.

In this project, EIW Belgrade shall make a production step-up in another field of 'green' energy.

"Renewable energy sources are present and future of electrical power, and, by our work, we try to position ourselves as one of leading companies in this domain. I believe that our work at the project Wind Farm Čibuk 1, shall be another confirmation of our efficiency in the field of renewable energy sources", said Zelenović.



U odlagač ugrađeni ormari proizvedeni u EMR Beograd Spreader operates with cabinets produced in EIW Belgrade



Elnos Grupa montirala transformator u HE Višegrad  
Elnos Group installed a transformer in HPP Višegrad

# Veliki poduhvat u HE Višegrad

## A huge undertaking in Hydro-Power Plant Višegrad

**SR** Jedna je od najbitnijih karika za stabilnost i sigurnost u elektroenergetskom sistemu Srbije, hidroelektrana Višegrad, smještena je u specifičnom topografskom terenu krivudavog toka Drine. Upravo zbog toga, isporuka i montaža novog transformatora za ovu hidroelektranu predstavlja još jedan u nizu naših velikih poduhvata. Naime, hidroelektrana u Višegradi jedna je od rijetkih na ovim prostorima koja transformaciju sa generatorskog napona na 400 kV vrši pomoću tri jednofazne transformatora. Njena specifičnost je u tome što umjesto standardnog trofaznog transformatora postoje četiri monofazne jedinice (četvrta služi kao rezerva), svaka snage 115 MVA. Razlog za ovakvo rješenje je veliki broj tunela na putu ka Višegradu, za koje su trofazni transformatori prevelikih dimenzija i ne mogu se dopremiti do hidroelektrane.

Kada su 2016. godine atmosferska pražnjenja dovela do oštećenja jednog od već postojećih transformatora na HE Višegrad, bilo je neophodno da se pristupi izradi novog transformatora. Ovaj kompleksan projekat obuhvatao je projektovanje, izradu, isporuku i puštanje pod napon jednofaznog uljnog transformatora snage 115 MVA, prenosnog odnosa  $420/\sqrt{3}/15.75$  kV. Projekat je povjeren konzorcijumu Elnos Grupa i Končar energetski transformator.

„Transport transformatora iz proizvodnog pogona Končara je predstavljaо poduhvat za sebe, jer je on težak oko 105 tona, a transportna masa iznosi oko 74 tone. Transport je izvršila specijalizovana kompanija“, naveo je Duško Čabrilović, projekt menadžer Elnos Grupe.

On je dodao da se montaža transformatora snage reda preko 100 MVA ne radi često, te je bilo neophodno obezbijediti neophodnu mehanizaciju i opremu za montažu. Kompletan poduhvat izведен je uspješno, što je potvrđeno prilikom ispitivanja transformatora. Realizacijom ovog jednogodišnjeg projekta hidroelektrana Višegrad je dobila neophodnu sigurnost i rezervu.

**EN** One of the most important link for stability and security in the Serbian power system, the Hydro-Power plant Višegrad, is located in the specific topographical field of the winding stream of the Drina River. For this reason, the delivery and installation of a new transformer for this hydro power plant is another in a series of our huge ventures. Namely, HPP in Višegrad is one of the rare plants in this region whose transformation from generator voltage of 400 kV is made through three one-phase transformers. Its specific feature is that, instead of standard three-phase transformer, there are four one-phase units (the fourth is a backup unit),

each with 115 MVA capacity. Reason for this kind of solution is a big number of tunnels on the way to Višegrad and these three-phase transformers are too big for them and they cannot be delivered to the hydro-power plant.

When in 2016, atmospheric discharges caused damages of one of existing transformers on the HPP Višegrad, it was necessary to start production of new transformer. This complex project included design, producing, delivery and online commission for one-phase oil transformer of 115 MVA capacity, transfer relation  $420/\sqrt{3}/15.75$  kV. Project was trusted to consortium Elnos Group and Končar electrical power transformers.

“Transport of transformers from production plant of Končar was an endeavor itself since the transformer weighs about 105 tons and transport mass is about 74 tons. Transport was made by specialized company”, said Duško Čabrilović, Elnos Group Project Manager.

He added that assembly of transformers of over 100 MVA power was not performed very often, so it was necessary to provide needed mechanization and equipment for assembly. Entire endeavor was performed successfully, which was confirmed in testing. By realization of this one-year project, hydro-power plant Višegrad got necessary safety and backup.

# Dušan Torbica najbolji privrednik 2017.

Dušan Torbica the Best Businessman in 2017

**SR** "Iza Elnos Grupe je veoma uspješna poslovna godina. Učvrstili smo partnerstva i napravili značajne iskorake na skandinavskom tržištu. Zahvaljujući vrijednom radu i posvećenosti ostvarili smo svoje poslovne snove i motivisani smo da realizujemo nove uspjehe u budućnosti", rekao je prilikom preuzimanja nagrade za najboljeg privrednika 2017. godine Dušan Torbica, predsjednik Uprave Elnos Grupe.

Prestižna potvrda uspješnog liderstva predsjedniku Uprave Elnos Grupe je stigla u vidu priznanja "Nezavisnih novina", čije uredništvo tradicionalno, krajem godine, proglašava ličnosti koji su svojim radom obilježile godinu.

"Naši projektni i operativni timovi izgrađuju i oživljavaju najsloženije nove tehnološke elektroenergetske infrastrukture širom Evrope, pozicionirali smo se među liderске kompanije u našoj oblasti djelovanja. Elnos Grupi će i ubuduće posebno zadovoljstvo predstavljati rad na domaćem tržištu, gdje učestvujemo u projektima stvaranja energetske budućnosti RS i BiH", istakao je Torbica povodom dobijanja nagrade.

Manifestacija izbora ličnosti godine "Nezavi-

snih novina" je ove godine održana 15. put, a priznanja se dodjeljuju najzaslužnijim ličnostima iz sfere političkog, privrednog i kulturnog života zemlje.

**EN** "Elnos Group left a very successful year behind. We strengthened partnerships and made significant steps out on Scandinavian market. Thanks to industrious work and devotion, we acquired our business dreams and are motivated to perform new successes in future", said Dušan Torbica, the President of the Elnos Group Management, while receiving the reward for the Best Businessman in 2017.

Prestigious confirmation of successful leadership for the President of the Elnos Group Management was in the form of recognition by "Nezavisne novine", whose editorial, traditionally, at the end of year, announces people whose work marked the year.

"Our design and project teams construct and breathe in lives for the most complex technologic electrical power infrastructures throughout Europe. We are positioned among leader com-

panies in our field of work. In future as well, it will be a pleasure for Elnos Group to work on domestic market, where we participate in projects of creating electrical power future of the RS and BiH", stated Torbica on the occasion of receiving the reward.

Event of electing the person of the year by "Nezavisne novine" was held for 15th time this year and reward is presented to people from political, economic and cultural national life.

## PRIZNANJE PRIVREDNE KMORE BANJALUKA

JEDNA OD NAJSTARIJIH PRIVREDNIH ASOCIJACIJA NA NAŠIM PROSTORIMA, PRIVREDNA KOMORA BANJALUKA, OVE GODINE JE ELNOS GRUPI URUČILA POSEBNO PRIZNANJE ZA DOPRINOS U RADU OVE PRIVREDNE INSTITUCIJE. PRIVREDNA KOMORA BANJALUKA JE OVE GODINE OBILJEŽILA 115 GODINA POSTOJANJA.

## RECOGNITION BY CHAMBER OF COMMERCE BANJA LUKA

ONE OF THE OLDEST ECONOMIC ASSOCIATIONS IN OUR REGIONS – CHAMBER OF COMMERCE BANJA LUKA – AWARDED ELNOS GROUP WITH SPECIAL RECOGNITION FOR CONTRIBUTION IN WORK OF THIS ECONOMIC INSTITUTION THIS YEAR. CHAMBER OF COMMERCE BANJA LUKA HAS CELEBRATED 115 YEARS OF ITS EXISTENCE THIS YEAR.



Dušan Torbica, predsjednik Uprave Elnos Grupe prilikom uručenja nagrade  
Dušan Torbica, President of Elnos Group receiving the award



Milan Martinović, direktor Elnos Nordic-a Milan Martinović, Director of Elnos Nordic

# MINI-JUBILEJ PET GODINA ELNOS NORDIC-a

Mini-jubilee Five years of Elnos Nordic



*Saradnja sa vodećim švedskim i nordijskim kompanijama iz oblasti energetike i više od 30 projekata koje smo realizovali, najbolje svjedoče o postignutom uspjehu*

*Cooperation with leading Swedish and Nordic companies from the field of electric power and more than 30 projects we performed are the best evidence for achieved success*

**SR** Švedsko tržište energetike je jedno od najnaprednijih na svijetu. Elnos Nordic, dio naše grupacije u Švedskoj, prošle godine je obilježio mini-jubilej pet godina rada. Kada sumiramo rezultate ostvarene u ovom periodu, možemo sa zadovoljstvom reći da je Švedska postala tržište Elnosa, ne samo u osnovnoj djelatnosti, nego i u pravnom i finansijskom pogledu. Jubilej je bio povod za razgovor sa direktorom Elnos Nordic-a Milanom Martinovićem.

**Da li ste vi kao direktor kompanije zadovoljni rezultatima poslovanja u proteklom periodu?**  
Veoma sam zadovoljan, mada mislim da uvijek može biti bolje. Uspjeh Elnos Grupe na nordijs-

skom tržištu veliki je iskorak za naš koncern. Marlivo smo gradili status kompanije koja je danas aktivni učesnik u projektima izgradnje energetske budućnosti Švedske. O ovom uspjehu najbolje svjedoče naša saradnja sa vodećim švedskim i nordijskim kompanijama iz oblasti energetike i više od 30 projekata koje smo realizovali.

**Kako su izgledali počeci i prvi projekti? Šta su tada bili najveći izazovi?**

Prvi projekat je nezaboravan. Podsjetio bih da je prvi korak Grupe na internacionalnom tržištu napravljen prvim projektima u Švedskoj, nakon čega je osnovan Elnos Nordic AB u Vesterusu. Bili smo fokusirani na to da postanemo jedan od

najpouzdanijih kooperanata vodećih švedskih i nordijskih energetskih kompanija za objekte do naponskog nivoa 500 kV. Tada nam je glavni izazov bio da se ekipe adaptiraju i naviknu na radne uslove i procedure. Uspjeli smo u tome, zahvaljujući volji i maksimalnom ličnom angažovanju svakog radnika.

### **U ovih pet godina saželi su se brojni projekti. Među njima su i kapitalni projekti, ali i oni rađeni u ekstremnim uslovima. Da li smo uspjeli odgovoriti postavljenim izazovima?**

Definitivno smo uradili i više nego što se očekivalo. Naši ljudi su fantastično snalažljivi, prilagođavaju se različitim sredinama i uslovima u kojima se nadu. Bilo je velikih izazova. Radili su na ekstremno niskim temperaturama, na velikoj visini, u ekološki zaštićenim područjima sa rigoroznim mjerama za kretanje i rad. Ponosan sam na to što smo pronašli prave odgovore na svaki od ovih izazova.

### **Koji su najznačajniji projekti u kojima smo učestvovali i šta možemo očekivati u budućnosti?**

Profesionalno izvođenje radova, u skladu sa zahtjevima ovog tržišta, otvorilo nam je mogućnost da radimo u različitim oblastima energetike. Od kapitalnih projekata bili su izdvojili Jugozapadni link 2, koji je bio jedan od najvećih energetskih projekata u Švedskoj. Ovo je projekt izgradnje novog dalekovoda 400 kV Hallsberg–Brakeryd, na kome smo uradili fantastičan posao. Među brojnim referencama u oblasti dalekovoda, sa kompletnim spektrom najrazličitijih poslova i izazova su i DV 2x130 kV Barkeryd-Nässjö, DV 130 kV Storfinnforsen-Ögonfagnaden i Ögonfagnaden-Isibillstjarn. Za nas je veoma važan i projekt modernizacije 400 kV trasoforanice Viefas, u oblasti Arktičkog polarnog kruga, kojim smo portfolio u Švedskoj proširili u oblast trasofanica.

Sve reference i iskustvo koje smo stekli otvaraju nam mogućnost i za učešće u kapitalnim infrastrukturnim projektima u budućnosti.

### **Da li se radnici koji dolu u Švedsku lako prilagode načinu rada u EU? Od treninga koje moraju proći, do strogih mjera zaštite na radu?**

Švedsko zakonodavstvo stavlja najveći akcenat na mjere bezbjednosti i zaštite na radu. Iako se ove mjere svakodnevno pooštavaju, naši zaposleni ih vrlo odgovorno ispunjavaju i imaju sve potrebne sertifikate za rad u EU. Sa druge strane, politika našeg koncerna je takva da ovako stroga pravila smatramo dobrim, jer njihovo sprovođenje doprinosi bezbjednosti radnika na poslu, a to u konačnici doprinosi boljem izvođenju radova.

**Sinergija domaćih stručnjaka u Švedskoj i ekipa**

### **iz inženjeringu na nivou Grupe daje provjereno dobre rezultate. Koliko je vaša dobra komunikacija bitna za ostvarenje ciljeva?**

Upravo je komunikacija fino vezivno tkivo od koga zavise uspjeh i motivacija na svakom projektu. Dobra komunikacija je veoma bitna. Lokalni 'know-how', poznavanje stranog tržišta i transparentna komunikacija sa investitorom, kao i sa ljudima koji dođu da rade na ovom terenu i tržištu, veoma su bitni.

### **Kako su kolege iz švedskih kompanija prihvatile naše ekipe?**

Mogu reći da su nas prihvatali fantastično, jer stalno dobijamo pohvale o dobroj organizaciji, o disciplini na radu, o pridržavanju pravila u oblasti zaštite na radu. Naši su radnici veoma spremni, imaju modernu opremu, rade savjesno. Upravo zahvaljujući nivou kvaliteta rada naših radnika, dobijamo nove poslove. Posebno bih istakao relacije koje naši site-manager-i uspostavljaju sa našim investitorima, partnerima i supervizorima. Ta komunikacija je, naravno, pored kvalitetno urađenog posla, ključna za sticanje povjerenja koje smo stvorili sa njima.

### **Koje planove na nordijskom tržištu imate u narednom periodu?**

Plan nam je da dodatno ojačamo svoju poziciju na tržištu Švedske, kroz saradnju sa našim dugogodišnjim partnerima. Smatramo da će uspostavljanje site-management-a na nivou Elnos Nordic-a, koje upravo završavamo, doprinjeti još intenzivnijoj saradnji sa našim partnerima, kvalitetnijem sagledavanju projekata i zahtjeva tržišta. Ovo će biti dodatni benefit kako za Grupu, tako i za naše partnere.

### **Koliko je za vašu karijeru i uspjeh važna porodica?**

Podrška porodice je neuporedivo najznačajnija karika za stvaranje uspješne karijere. Mislim da bez te podrške ne bi bilo energije i da bi bez nje bilo nemoguće stvoriti dobru karijeru. Za mene su podrška moje porodice i mojih bližnjih jedna od najjačih vrijednosti utkanih u moj rad i karijeru.

**EN** Swedish market of electric power is one of the most advanced in the world. Elnos Nordic, part of our Group in Sweden, celebrated mini-jubilee last year – five years of operation. When we sum the results achieved in this period, we can be pleased and say that Sweden became Elnos' market, not only in core industry, but in legal and financial sense, too. Jubilee was a reason to interview Milan Martinović, Director of Elnos Nordic.

**Are you, being the Director of the company,**

### **satisfied with business results in the previous period?**

I am very satisfied, though I believe it can always be better. Success of Elnos Group on Nordic market is a great step forward for our concern. We worked hard to build a status of the company that is an active participant in the projects of constructing electrical power future of Sweden. The best witnesses on this success is our cooperation with leading Swedish and Nordic companies from the field of electric power and more than 30 projects we performed.

### **How did start and first projects look like? What were the biggest challenges at the time?**

The first project is unforgettable. I would like to remember that the first step of the Group on international market was made by the first project in Sweden and Elnos Nordic AB in Vesteros was established afterwards. We were focused to become one of the most reliable cooperators of the leading Swedish and Nordic electrical power companies for facilities of 500 kV voltage level.

Back then, our main challenge was to adapt and accustom teams to working conditions and procedures. We managed it thanks to the will and maximum personal engagement of each employee.

### **In these five years, there have been many projects performed. Some of them are capital projects, but also those performed in extreme conditions. Have we managed to respond to challenges we had faced?**

We definitely did even more than we had expected. Our people are fantastically resourceful. They adapt to various environments and conditions they are put into. There were big challenges. Works were done in extreme low temperatures, at big heights, in ecologically protected areas with rigorous measures for movement and work. I am proud of the fact we found the right responses to each of these challenges.

### **What are the most important projects we took part in and what could be expected in future?**

Professional work performance complying with requests of this market opened a possibility to work in various electrical power fields for us. As for capital projects, I would like to set aside South-West link 2, which was one of the biggest electrical power projects in Sweden. This is the project of constructing new transmission line 400 kV Hallsberg-Brakeryd, where we performed fantastic work. Among numerous references of the transmission line field, with entire spectrum of the

most various activities and challenges, also are TL 2x130 kV Barkeryd-Nässjö, TL 130 kV Storfinnforsen-Ögonfagnaden and Ögonfagnaden-Isibillstjarn. Also, a very important project for us is modernization of 400 kV Vietas substation in the area of Arctic Polar Circle, which expanded our Swedish portfolio to substation field.

All references and experience we acquired provide us with possibility for participation in capital infrastructural projects in future.

**Do employees coming to Sweden easily adjust to way of working in the EU? Starting with training they have to go through all the way to severe measures of protection at work?**

Swedish legislation puts the biggest accent on safety measures and protection at work. Although these measures get stricter on daily basis, our employees are responsible in obeying them and own all the necessary certificates for work in the EU. On the other hand, our concern policy is that these strict rules are to be considered as good since their implementation contributes employees' safety at work and this contributes better works performance finally.

**Synergy of domestic experts in Sweden and teams from engineering at the Group level provides in proven good results. How important is your good communication for goals achievement?**

Communication is the fine binder that success and motivation depend on each project. Good communication is very important. Local 'know-how', acquaintance of foreign market and transparent communication with investor, as well as with people who come to work on this terrain and market, are very important.

**How did colleagues from Swedish companies accepted our teams?**

I can say we were accepted fantastically since we get compliments on good organization and on obeying rules on protection at work all the time. Our employees are very competent; they have modern equipment and work conscientiously. Thanks to our employees' quality of work we get new projects. I would especially like to point out relations that our Site Managers establish with our Investors, partners and supervisors. That communication, of course apart from good qual-

ity of work performance, is the key for acquiring trust we created with them.

**What are your plans on Nordic market in the upcoming period?**

It is our plan to additionally strengthen our position on Swedish market through cooperation with our long-term partners. We believe that establishment of Site Management on the level of Elnos Nordic, which is just about to be completed, shall contribute more intensive cooperation with our partners, better quality of reviewing the projects and market requirements. This shall be additional benefit both for Group and our partners.

**How important is the family for your career and success?**

Support of the family is the most important link by far for creating successful career. Without this support, I believe there would be no energy and it would not be possible to establish a good career without it. As for me, support of my family and closest ones is one of the biggest values woven in my work and career.

**U praktičnom pristupu radu je ključ uspjeha**  
Efficient approach holds the key to success



## PROJEKTI REALIZOVANI U ŠVEDSKOJ PROJECTS REALIZED IN SWEDEN

### ● DALEKOVODI (DV) TRANSMISSION LINES (TL)

<b>01 DV TL 130 kV</b> Anglarna-Höfors	<b>02 DV TL 2x130</b> Barkeryd-Nässjö	
<b>03 DV TL 130 kV</b> Karsefors-Linehed	<b>04 DV TL 130 kV</b> Storfinnforse-Ögonfågnaden	2012
<b>05 DV TL 400 kV</b> Hallsberg - Barkeryd (Southwest link 2)		2013
<b>06 DV TL 130 kV</b> Ögonfågnaden- Isbillstjärn	<b>07 DV TL 130 kV</b> Saxen-Flatenberg	<b>08 DV TL 130 kV</b> Moliden-Sidensjö
<b>09 DV TL 400 kV</b> Hjalta-Vittersjö	<b>10 DV TL 130 kV</b> Korsberga-TS SS Tappan	<b>11 DV TL 130 kV</b> Djuptjarn-Nederkalix
<b>12 DV TL 130 kV</b> Lärkeröd-Mörarp	<b>13 DV TL 2x130 kV</b> Mörarp-Landskrona	
<b>14 DV TL 220 kV</b> Hatuna, KL 12	<b>15 DV TL 400 kV</b> Djurmo-Storfinnforse	<b>16 DV TL 130 kV</b> za TS for SS Frovifors
<b>17 DV TL 130 kV</b> za TS for SS Kramfors		
<b>18 DV TL 400 kV i 130 kV</b> Karlstlund	<b>19 DV TL 130 kV</b> Ostansio-Alberg	<b>20 DV TL 130/50 kV</b> TS SS Stavlo-TS SS 130/50 kV Linsankan
<b>21 DV TL 130 kV</b> Södertälje		

### ● TRAFOSTANICE (TS) SUBSTATIONS (SS)

<b>01 TS SS 400 kV</b> Vietas	<b>02 TS SS 45/23 kV</b> Junosuando	
<b>03 TS SS 130 kV</b> Kramfors	<b>04 TS SS 130/50 kV</b> Stavlo	<b>05 TS SS 130/50 kV</b> Linsankan



**-30°**  
Rad u teškim vremenskim uslovima  
Working in difficult weather conditions

**70 m**  
Rad na visini  
Working at a height

**Wind Turbine Icon**  
Rad u zoni vjetroparkova  
Working in the wind farm zone

**Tree Icon**  
Rad u ekološki zaštićenim zonama  
Working in ecologically protected areas

**Helicopter Icon**  
Korištenje najmoderne specijalne mehanizacije  
Use of the most modern special machinery

Postajemo jači

# NOVA ČLANICA U EU

We are getting stronger New member in EU





## **Planirana nova ulaganja, prvenstveno u kadar i opremu koja će biti garancija za rast kvaliteta i konkurentnosti na slovenačkom i drugim evropskim tržištima**

*Planned new investments, in the first place for staff and equipment, which shall be guarantee for improvement of quality and competence on Slovenian and other European markets*

**SR** Jedan od najvažnijih poslovnih poduhvata Elnos Grupe početkom 2017. je osnivanje nove članice u Sloveniji. Tada smo, zajedno sa slovenačkim partnerima, osnovali najveću kompaniju Elnos Grupe na području EU – Elektro novi sistemi (ENS) d.o.o. sa sjedištem u Ljubljani. Cilj osnivača kompanije je da slovenačkom i evropskom tržištu ponudi kvalitetnu uslugu na području izgradnje i rekonstrukcije električne mreže na svim naponskim nivoima.

Kompaktan i iskusni tim sa bogatim iskuštvom i referencama, koji čine električari, elektrotehničari i inženjeri, bio je veoma motiviran da što prije počne sa operativnim radom

pod novim imenom. Pripreme su tekle ubrzano. Ostvarena je izuzetna sinergija pravnih, ekonomskih, prodajnih, IT, marketinških i naravno aktivnosti inženjeringu timova Grupe u Sloveniji i RS. I, to je urodilo plodom. Krajem februara, mjesec dana po osnivanju, ekipe ENS-a su bile na prvom projektu, koji je za naručioca iz Ljubljane realizovan u Gospicu u Hrvatskoj.

Direktor kompanije Jure Jagrič ističe: „Elektro novi sistemi svoje usluge nude, prije svega, partnerima na slovenačkom tržištu. Naš portfolio je iz oblasti visokonaponskih dalekovoda, transformatorica, kao i srednjenačke mreže. Posebno bih naglasio da u kompaniji imamo grupu iskusnih sertifikovanih montera za radove na 110 kV kablovima, što je nova usluga u portfoliju koji Elnos Grupa osigurava svojim partnerima širom Evrope“.

Visoka motivisanost i stručnost kadrova iz Ljubljane potvrđuje se od prvog, pa sa svakim novim projektom. Na matičnom tržištu u Sloveniji ENS je realizovao 10-ak referenci. Zajedno sa ostalim radnicima Grupe učestvovali su u radnim projektima na Islandu, a upravo se pripremaju za zajednički rad u Norveškoj.

Jagrič je zadovoljan poslovnim rezultatima dostignutim u prvih 10 mjeseci rada. On ističe da su njegovi saradnici sa mnogo znanja, iskustva i pozitivne energije zaslužni za to što je ENS poželjan partner za izvođenje radova na elektroenergetskim projektima širom Slovenije i na području EU. „Od posebne je važnosti da su kvalitetom našeg rada zadovoljni naši naru-

čioc, u šta ćemo ulagati maksimalne napore i ubuduće“, dodaje Jagrič.

Iako mlada, ENS je i društveno odgovorna kompanija. Od projekata iz ove oblasti izdvajamo sponsorstvo i učešće na stručnoj konferenciji CIGRE, koja je održana u maju u Mariboru.

„Na osnovu dosadašnjih rezultata, ENS u 2018. godini planira nova ulaganja, prvenstveno u kadar i opremu koja će biti garancija za rast kvaliteta i konkurentnosti na slovenačkom i drugim evropskim tržištima“, zaključio je Jagrič.

**EN** One of the most important business projects by Elnos Group from the beginning of the 2017 was establishment of new member in Slovenia. Back then, along with Slovenian partners, we established the biggest company in Elnos Group in EU area – Elektro novi sistemi (ENS) Ltd. with head office in Ljubljana. Aim of the company founders is to offer good quality service in the field of construction and rehabilitation of electrical network of all voltage levels to Slovenian and European market.

Compact and experienced team with rich experience and references, made up from electricians, electrical technicians and engineers, was very motivated to start operative work under new name as soon as possible. Preparations went fast. Excellent synergy was made among legal, economic, sales, IT, marketing and, of course, activities by engineering teams of the Group in Slovenia and RS. And it worked. By the end of February, a month after its establishment, ENS



Dalekovodi za vrijeme koje dolazi  
Transmission lines of time to come



Tim ENS-a je spoj bogatog iskustva i pozitivne energije  
ENS team combines extensive experience and positive energy



JURE JAGRIČ

direktor ENS Slovenija  
Director of ENS Slovenia

**“** Od posebne je važnosti da su kvalitetom našeg rada zadovoljni naši naručiocu, u šta ćemo ulagati maksimalne napore i ubuduće.

teams were tasked with their first project, which was realized in Gospić, Croatia for Employer from Ljubljana.

Jure Jagrič, the Director of the company, says: "Elektro novi sistemi offer their services, in the first place, to partners of Slovenian market. Our portfolio is a part of high-voltage transmission lines, substations as well as medium-voltage network. I would like to especially stress that our company has a group of experienced certified fitters for works of 110 kV cables, which is a new service within the portfolio, which is provided for Elnos Group partners all over Europe".

High motivation and Ljubljana staff skills have been confirmed with the first and each and every new project. In its home market, in Slo-

venia, ENS realized about 10 references. Along with other employees of the Group, they participated in working projects in Iceland, and currently they are preparing for joint work in Norway.

Jagrič is satisfied with business results reached in the first 10 months of the operation. He says that his associates having a lot of knowledge, experience and positive energy are to credit for ENS as a partner for works performance of electrical power projects throughout Slovenia and EU. "It is especially important that our employers are satisfied with quality of our work and we are going to put maximum of our efforts in future as well", adds Jagrič.

Though young, ENS also is socially responsible company. Out of projects in this field, we would like to set aside sponsorship and participation in CIGRE conference held in May in Maribor.

"On the grounds of results so far, ENS plans new investments, in the first place for staff and equipment, which shall be guarantee for improvement of quality and competence on Slovenian and other European markets in the 2018", concludes Jagrič.

**“** It is especially important that our employers are satisfied with quality of our work and we are going to put maximum of our efforts in future as well.

# NORVEŠKA, NAŠE NOVO TRŽIŠTE

Norway, our new market

*Učestvujemo u realizaciji projekta NordLink-Zeleni link, jednom od kapitalnih projekata koji će omogućiti realizaciju velikog poduhvata stvaranja integrisanog evropskog energetskog tržišta*

*We are participating in realization of project NordLink-Green Cable, one of capital projects to provide realization of big endeavor to establish integrated European electrical power market*



Dio smo projekta NordLink We are a part of NordLink project

**SR** Širenje na tržište Norveške je bio prirodan nastavak aktivnosti Elnos Grupe u nordijskim zemljama. Naša djelatnost u „zemlji vikinga i fjordova“ ozvaničena je u avgustu prošle godine i odnosi se na inženjering u oblasti energetike, tj. projektovanje, izgradnju i rekonstrukciju elektroenergetskih sistema visokog napona. Miroslav Tuvić, direktor sistemske prodaje Elnosa u Banjaluci, bio je uključen u dvogodišnje istraživanje, a sada i rad na ovom tržištu. Tuvić ističe da je za izlazak na tržište Norveške bilo potrebno proći zahtjevnu proceduru otvaranja kompanije, koja je dugotrajna i zahtijeva znatnija finansijska ulaganja.

Na novom tržištu smo dobili i prvi ugovor, radovi su počeli u januaru 2018. Za vrijeme pregovora naša kompanija je pokazala visok nivo fleksibilnosti i profesionalnosti. Novi trend rasta zahtjeva iz oblasti organizacije rada, bezbjednosti i zaštite na radu, u svim nordijskim zemljama je sigurno među najvišim u EU/EEZ. Zahvaljujući našem dugogodišnjem iskustvu i radnoj predanosti ispunili smo sve potrebne zahtjeve za rad u ovoj zemlji. „Već smo ispratili slične promjene u Švedskoj i na Islandu. Norveško tržište je novo za nas. Uvidjeli smo da su navedeni zahtjevi na veoma visokom nivou i da je potrebna značajno veća administrativna podrška za realizaciju projekata u ovom segmentu. Naše višegodišnje iskustvo nam je помогло да ове zahtjeve ispunimo, što je rezultiralo prvim sklopljenim ugovorom u Norveškoj“, rekao je Tuvić.

Naš prvi projekat u Norveškoj, NordLink-Zeleni link, nije izuzetan samo u tehničkom smislu. Ovo je jedan od kapitalnih projekata koji će omogućiti stvaranje integrisanog evropskog energetskog tržišta. NordLink interkonekcija je energetska veza kojom će se obezbijediti razmjena elektroenergije, dobijene isključivo iz obnovljivih izvora, između elektroenergetskih sistema Njemačke i Norveške.

Prenos energije će se vršiti najdužim HVDC sistemom u Evropi. Interkonekcija je ukupne dužine 623 km, između dvije pretvaračke stanice locirane u Wilster-u u Njemačkoj i Tonstad-u u Nor-

veškoj. Riječ je o prenosu energije jednosmernim (DC) sistemom. Elnos Grupa je, kao podizvodač ABB-a, zadužena za izvođenje elektromontažnih radova na izgradnji pretvaračke stanice Tonstad u Norveškoj. Naponski nivo trafostanice je +/- 515 kV, dok prenosni kapacitet iznosi 1.400 MW.

**EN** Expansion to Norwegian market was a natural continuance of Elnos Group activities in Nordic countries. Our activity in “the land of Vikings and fjords” was official in August last year and it refers to engineering in the field of electrical power, i.e. design, construction and reconstruction of electrical power systems of high-voltage. Miroslav Tuvić, Director of System Sale of Elnos in Banja Luka, was included in two-year research and is working in this region currently. Tuvić says that for start in the Norwegian market, a demanding procedure was supposed to go through in order to establish a company, and this procedure is long-term and requires significant financial investments.

On this market, we got our first contract. Works is started in January 2018. During negotiations, our company showed high level of flexibility and professionalism. New trend of requirements growth in the field of work organization, safety and protection at work in all Nordic countries surely is one of the highest in the EU/EEU. Thanks to our long-term experience and devotion to work, we met all the necessary requirements for work in this country. “We have already followed in similar changes in Sweden and in Iceland. Norway market is new to us. We realized that stated requirements had been on a really high level and that significantly bigger administrative support for project realization in this segment was necessary. Our long-term experience helped us to meet all these requests, which resulted in the first signed contract in Norway”, said Tuvić.

Our first project in Norway, NordLink-Green Link, is not an exceptional project only technically. This is one of capital projects to provide establishment integrated European electrical power market. NordLink interconnection is an electrical

power connection that is to provide exchange of electrical power, acquired from renewable sources only, between electrical power systems of Germany and Norway.

Transfer of power shall be performed by the longest HVDC system in Europe. Interconnection is 623 km of total length between two transformer stations located in Wilster in Germany and Tonstad in Norway. This is transfer of energy through direct current (DC) system. Elnos Group, being sub-contractor to ABB, is in charge of electrical assembly works on construction of transformer station Tonstad in Norway. Voltage level of the substation is +/- 515 kV, whereas transfer capacity amounts to 1,400 MW.

#### NORDLINK-ZELENI LINK

NORDLINK JE PRVA INTERKONEKCIJA KOJA ĆE OMOGUĆITI DIREKTNU VEZU IZMEĐU NORVEŠKOG I NJEMAČKOG ENERGETSKOG TRŽIŠTA. ON ĆE POVEZATI DVA SAVRŠENO KOMPLEMENTARNA SISTEMA ZA RAZMJENU OBNOVLJIVIH IZVORA ENERGIJE: NJEMAČKI VJETAR I SOLARNU ENERGIJU S JEDNE STRANE I NORVEŠKU HIDROENERGIJU S DRUGE.

#### NORDLINK-GREEN LINK

NORDLINK IS THE FIRST INTERCONNECTION TO ENABLE DIRECT CONNECTION BETWEEN NORWEGIAN AND GERMAN ELECTRICAL POWER MARKETS. IT SHALL CONNECT TWO PERFECTLY COMPLEMENTING SYSTEMS FOR EXCHANGE OF RENEWABLE ENERGY SOURCES: GERMAN WIND AND SOLAR ENERGY ON ONE HAND AND NORWEGIAN HYDRO-POWER ON THE OTHER.



MIROSLAV TUVIĆ

direktor sistemske prodaje u Elnosu Banjaluka  
Director System Sales in Elnos Banja Luka

**“** Iskorak na tržište Norveške nam je višestruko značajan. Prije svega, kao mogućnost da i u zemlji koja je treći svjetski izvoznik energije potvrdimo svoja znanja, profesionalni potencijal i visok stepen tehničkih standarda. Nakon segmenta trafostanica, trenutno radimo i na razvoju projekata u oblasti dalekovoda i elektrana.

**“** Step forward to the Norwegian market has multiple significance for us. In the first place, it is an opportunity for us to confirm our knowledge, professional potential and high level of technical standards in a country that is the third power exporter in the world. After substations segment, currently we also work on development of the project in the field of transmission lines and power plants.



Logistički biznis koncept

# U tačno vrijeme, na ključnom mjestu

Logistic business concept - Right time, right place

***Ulaganje u najsavremenija i vrhunski opremljena vozila je naš odgovor na moderne izazove u oblasti transporta***

*Investment in the most modern and perfectly equipped vehicles is our response to modern challenges in transport field*

**SR** Jedan od glavnih poslovnih postulata Elnos Grupe glasi da je savremen logistički pristup ključan za efikasnu, racionalnu i preciznu realizaciju bilo kog poslovнog poduhvата. Ovo je koncept po kojem je naša kompanija već dugi niz godina prepoznatljiva na tržištu.

Sve snažnija logistička podrška koju obezbeđujemo, daje nam mogućnost da u pravo vrijeme i na pravom mjestu uvijek pozicioniramo naše resurse.

Pravi praktičan pokazatelj našeg logističkog principa je vozni park, koji na nivou Elnos Grupe broji 160 putničkih, terenskih i teretnih vozila.

Ulaganja u vozni park su dokaz u kojoj mjeri je našoj kompaniji važno održavanje i povećavanje pouzdanosti ovog parka.

Samo tokom protekle godine, broj automobila i teretnih vozila na nivou kompanije u Banjaluci je podmlađen za 20 novih vozila. Vozni park kompanije Elnos BL broji ukupno 100 vozila, 85 teretnih i 15 putničkih. Najveći broj teretnih, privredni vozila nabavljan je zbog uvijek novih i rastućih projektnih potreba, a među njima prednjače marke: Mitsubishi, Citroen, Peugeot i Mercedes, dok su putnička vozila u najvećoj mjeri marke Peugeot.

Na nivou kompanije Beograd, vozni park iz godine u godinu postaje sve bogatiji i danas broji ukupno 47 vozila, 29 teretnih i 18 putničkih. Najzastupljenija marka putničkog vozila ovog parka je Škoda, dok su teretna vozila različitih marki i proizvođača.

Preostali broj vozila je najvećim dijelom u okvirima naše najmlađe evropske članice, kompanije ENS Ljubljana.

Elnos Grupa će i dalje nastaviti sa ulaganjima u najsavremenija i vrhunski opremljena vozila, jer je naš cilj stvaranje uvijek kvalitetnog i djelotvornog odgovora svim modernim izazovima i evropskim standardima u transportu.

**EN** One of the main business postulates of the Elnos Group is that modern logistic approach is crucial for efficient, rational and precise realiza-

tion of any business project. This is a concept our company has been recognized by on the market for many years.

Even stronger logistic support we ensure provides us with possibility to always position our resources in the right time in the right place.

True practical index of our logistic principle is our vehicle fleet, which, on Elnos Group level, counts 160 passenger, terrain and cargo vehicles.

Investments in vehicle fleet are evidence that our company takes care of maintenance and increase of reliability of this vehicle fleet.

Last year only, number of automobiles and freight vehicles at the level of the Company in Banja Luka rejuvenated with 20 new vehicles. Vehicle fleet of Elnos BL has 100 vehicles in total - 85 freight vehicles and 15 automobiles. Most of freight vehicles, economy vehicles was acquired due to ever new and increasing project needs, and among them, the following makes come in the first place: Mitsubishi, Citroen, Peugeot and Mercedes, whereas automobiles mostly are of Peugeot make.

As for Belgrade company level, year after year, vehicle fleet enriches and, nowadays, there are 47 vehicles, 29 freight vehicles and 18 automobiles. Škoda is the mark mostly present in automobiles, and as for freight vehicles, they come in various brands.

Remaining number of vehicles mostly are within our youngest European member country, Company ENS Ljubljana.

Elnos Group shall continue to invest in the most modern and perfectly equipped vehicles since it is our goal to always create a good quality and efficient response to all modern challenges and European standards in transport.

# Oni stvaraju budućnost

They create future



**ANA KOVIĆ**

**MLADI TIM INŽENJERA** je uspješno savladao prve velike izazove i spremno čeka vrijeme koje dolazi. Oni su nova snaga naše kompanije. Upoznajte ih

**YOUNG TEAM OF ENGINEERS** successfully overcome first big challenges and readily waits for times to come. They are new power of our company. Meet them

**“** Za mene je istinski izazov rješavanje novonastalih situacija na terenu, onih za koje nisu data projektna rešenja. Nezaboravno je iskustvo bilo biti dio projekta izgradnje dalekovoda na planini Dimitrov, na 1.250 metara nadmorske visine. Bio je to poduhvat u okviru kojeg sam iz svake nove nepredvidive situacije učila mnogo.

**Stručna spremna:**  
diplomirani inženjer građevinarstva

**Imenovanje:** projektni inženjer

**Najznačajniji projekat(i):**  
dalekovod 35 kV Medna-Čadavica,  
Eko-toplana Banja Luka (snage 49 MW)

**Hobi:** čitanje, istraživanje, sport

**Porodica:** prvenac roditeljima i sestra mlađem bratu

**“** To me, it is a true challenge to solve newly occurring situations on the field, those that have not been instructed by design solutions. It is unforgettable experience to be a part of project of constructing transmission line on Mountain Dimitrov at 1,250 meters altitude. It was a project where I learned a lot from each and every new unpredicted situation.

**Professional vocation:**  
Bachelor of Science in Civil Engineering

**Title:** Project Engineer

**Most important project(s):** transmission line 35 kV Medna-Čadavica, Eco-thermal power plant Banja Luka (capacity 49 MW)

**Hobby:** reading, research, sport

**Family:** first born and sister to a younger brother

**“** Želim da postanem ekspert u oblasti planiranja i vođenja projekata.

**Stručna spremna:**  
master inženjer elektrotehnike i računarstva

**Imenovanje:** projektni inženjer

**Najznačajniji projekat(i):**  
izgradnja nove TS 110/20 kV Kraljevci  
i rekonstrukcija TS 110/35 kV Beograd 2

**Hobi:** skijanje, ronjenje, gledanje filmova i serija

**Porodica:** neoženjen

**“** I want to become an expert in the field of planning and project management.

**Professional vocation:**  
Master in Electrical Engineering and IT

**Title:** Project Engineer

**Most important project(s):**  
construction of new SS 110/20 kV Kraljevci  
and reconstruction of SS 110/35 kV Beograd 2

**Hobby:** skiing, diving, movies and TV series

**Family:** single



**SRETEN ĆALASAN**



DRAGAN JUROŠEVIĆ



SLAVEN PAVLOVIĆ



VLADIMIR ILIĆ

**“** Svaki novi projekat je specifičan. Nijednog trenutka nije monotono, jer je na gradilištu uvijek dinamično. Nakon svakog uradenog posla osjećam da više znam i napredujem.

**Stručna spremna:**

diplomirani inženjer elektrotehnike

**Imenovanje:** projektni inženjer**Najznačajniji projekat(i):** izgradnja MHE Bočac 2, rekonstrukcija TS 110/35/10 kV Bijeljina 1**Hobi:** automobili**Porodica:** neoženjen

**“** Each new project is specific one. It is not dull in any moment because it is very dynamic on site all the time. I feel that I know more and that I get better after each work performed.

**Professional vocation:**

Bachelor of Science in Electrical Engineering

**Title:** Project Engineer**Most important project(s):** construction of MHPP Bočac 2, reconstruction of SS 110/35/10 kV Bijeljina 1**Hobby:** cars**Family:** single

**“** Najvećim izazovom smatram samostalno savladavanje znanja o tehnologijama sa kojima se nisam ranije susretao.

**Stručna spremna:** diplomirani inženjer elektrotehnike  
**Imenovanje:**

## projektni inženjer

**Najznačajniji projekat(i):**

izgradnja nove hidroelektrane Burfell na Islandu, GIS 245/132/12 kV u TS Krafla 49 na Islandu

**Hobi:** volim da proučavam i informišem se o novim i modernim tehnologijama iz oblasti elektrotehnike**Porodica:** sveže oženjen

**“** I believe the biggest challenge is acquiring knowledge on technology I did not come across before by myself.

**Professional vocation:**

Bachelor of Science in Electrical Engineering

**Title:** Project Engineer**Most important project(s):**

construction of new hydro-power plant Burfell on Iceland, GIS 245/132/12 kV in SS Krafla 49 on Iceland

**Hobby:** I like to study and get informed on new modern technologies in the field of electrical engineering**Family:** just married

**“** Najveće zadovoljstvo mi predstavlja sinhronizacija rada sa našim monterima na terenu, finalno ispitivanje, puštanje trafostanice u rad i, naravno, fakturisanje...

**Stručna spremna:** diplomirani inženjer energetike

**Imenovanje u kompaniji:** projektni inženjer**Najznačajniji projekat(i):**

rekonstrukcija TS Kramforš

**Hobi:** plivanje**Porodica:** stariji od dvoje dece

(neoženjen u fazi planiranja)

**“** My biggest satisfaction is synchronizing the work with our fitters on the field, final testing, commission of the substation and invoicing, of course...

**Professional vocation:**

Bachelor of Science in Energetics

**Title:** Project Engineer**Most important project(s):**

reconstruction of SS Kramfors

**Hobby:** swimming**Family:** elder one in family

of two children (single, planning phase)



STEFAN GOLUBOVIĆ



SLOBODAN BANOVIĆ



BOŽANA NIŠEVIĆ

**“** Još od studentskih dana sam želio da radim na projektima iz oblasti obnovljivih izvora energije. Nadam se da će mi se to i ostvariti, jer naša kompanija definitivno pruža takve mogućnosti.

**Stručna spremá:****Imenovanje:** projektni inženjer**Najznačajniji projekat(i):**

izrada odlagača 12.000 za TE Kolubara

**Hobi:** fudbal**Porodica:** neoženjen, "neki" se nadaju ne još zadugo

**“** Ever since I was a student, I dreamed of working on the projects in the field of renewable energy sources. I hope this will come true because our company definitely provides these opportunities.

**Professional vocation:** Master in Electrical Engineering and IT**Title:** Project Engineer**Most important project(s):** creation of Spreader 12.000 for TPP Kolubara**Hobby:** football**Family:** single, "some" hope not for long

**“** Najzadovoljniji sam u trenutku kada se po okončanju svih radova elektroenergetski objekat pusti u rad i sve funkcioniše kako treba. Cilj mi je da poslije stjecenog iskustva sam rukovodim projektima. Posebno bih se radovao ako bi to bili projekti međunarodnog karaktera, poput projekta rekonstrukcije HE Zvornik.

**Stručna spremá:****Imenovanje:** projektni inženjer**Najznačajniji projekat(i):**

rekonstrukcija hidroelektrane Zvornik

**Hobi:** dokumentarci, fotografija**Porodica:** po okončanju projekta HE Zvornik

**“** I am most satisfied in the moment when, once all the works complete, electrical power facility is commissioned and all functions well. It is my goal to manage the projects myself after experience acquired. It would be a special joy if those were international projects, such as project of reconstructing HPP Zvornik.

**Professional vocation:****Title:** Master in Electrical Engineering and IT**Most important project(s):**

reconstruction of HPP Zvornik

**Hobby:** documentary programs, photography**Family:** after HPP Zvornik project ends

**“** Oduvijek me je posebno zanimalo projektovanje elektroenergetskih objekata, u čemu već imam par godina iskustva. Usavršavanje u ovoj oblasti za mene bi predstavljalo posebnu satisfakciju i ostvarenje jednog od poslovnih ciljeva.

**Stručna spremá:****Imenovanje:** diplomirani inženjer elektrotehnike**Najznačajniji projekat(i):**

dalekovodi 110 kV Šamac-Odžak-Modriča, 110 kV

Kličev-Brezna, 110 kV Bar-Budva,

110 kV Banja Luka 6-Prijedor-Knežica

**Hobi:** putovanja, sport**Porodica:** mama, tata i stariji brat

**“** I have always been particularly interested in the design of electric power facilities, where I already have a couple years of experience. Training related to this field for me would be a special satisfaction and the achievement one of the business goals.

**Professional vocation:****Title:** Bachelor of Science in Electrical Engineering**Most important project(s):**

transmission lines 110 kV

Šamac-Odžak-Modriča, 110 kV Kličev-Brezna, 110 kV

Bar-Budva, 110 kV Banja Luka 6-Prijedor-Knežica

**Hobby:** travel, sport**Family:** Mom, dad and older brother

# NOVI PROJEKTI

## ELNOS GRUPE

### New projects of Elnos Group

#### BOSNA I HERCEGOVINA BOSNIA AND HERZEGOVINA



- 1 Potpuna rekonstrukcija TS 110/35/10 kV Bijeljina 1
- 2 Adaptacija TS 110/35/10 kV Pale
- 3 Izgradnja DV 110 kV Gacko–Nevesinje
- 4 Sanacija DV 2x110 kV Banjaluka 6–Prijedor–Knežica
- 5 Izgradnja MHE Sitonija
- 6 Izgradnja MHE Golubača
- 7 Zamjena 6 kV i 0,4 kV postrojenja u objektu 64 RiTE Ugljevik

- 1 Entire reconstruction of SS 110/35/10 kV Bijeljina 1
- 2 Adaptation of SS 110/35/10 kV Pale
- 3 Construction of TL 110 kV Gacko–Nevesinje
- 4 Rehabilitation of TL 2x110 kV Banjaluka 6–Prijedor–Knežica
- 5 Construction of MHPP Sitonija
- 6 Construction of MHPP Golubača
- 7 Replacement of 6 kV and 0.4 kV facilities in the object 64 M&TPP Ugljevik

#### SRBIJA SERBIA



- 1 Rekonstrukcija TS 110/35 kV Beograd 2
- 2 DV 110 kV Sremčica–Kolubara,  
izvođenje radova na prelazu preko željezničke infrastrukture
- 3 Uvođenje DV 110 kV u TS 110/20 kV Krnješevci
- 4 Rekonstrukcija i adaptacija DV 110 kV 101 AB  
Beograd 3–Kostolac, dionica J

- 1 Reconstruction of SS 110/35 kV Beograd 2
- 2 TL 110 kV Sremčica–Kolubara,  
performance of works on crossing over railway infrastructure
- 3 Installation of TL 110 kV to SS 110/20 kV Krnješevci
- 4 Reconstruction and adaptation of TL 110 kV 101AB  
Beograd 3–Kostolac, Section J

#### CRNA GORA MONTENEGRO



- 1 Zamjena turbinskog regulatora u HE Perućica
- 2 Nastavak ugradnje OPGW-a za Mtel u dužini preko 100 km
- 3 HVDC Lastva, elektromontažni radovi na  
konvertorskoj trafostanici za VN prenos energije

- 1 Replacement of turbine regulator of HPP Perućica
- 2 Continued construction of OPGW for Mtel, a distance of over 100 km
- 3 HVDC Lastva, electrical assembly works on  
converting substation for HV power transfer

#### ŠVEDSKA SWEDEN



- 1 Rekonstrukcija i dogradnja TS 130/20 kV Fagerhult i  
TS 130/20 kV Bjarnum
- 2 Montaža primarne opreme na izgradnji 400 kV trafostanice FT6  
Barsebäck i izgradnja pripadajućih priključnih dalekovoda
- 3 Montaža primarne opreme na izgradnji dvije nove 400 kV trafostanice  
Skogssäter CT15 i CT16 i izgradnja pripadajućih priključnih dalekovoda
- 4 Sanacija DV 380 kV Brigholmen
- 5 Izgradnja nove TS 130 kV Porjusberket, kompletni  
elektromontažni radovi
- 6 Elektromontažni radovi na DV 145 kV Kablifiering L26 Borlänge
- 7 Elektromontažni radovi na DV 130 kV ML87 i  
DV 40 kV ML322 Frövifors (Korsnäs)
- 8 Elektromontažni radovi na 145 kV VL48 Ed–Klädsäcksmyren

- 1 Reconstruction and upgrade of SS 130/20 kV Fagerhult and  
SS 130/20 kV Bjarnum
- 2 Installation of primary equipment for the construction of 400 kV substation  
FT6 Barsebäck and construction of the associated connecting transmission lines
- 3 Installation of primary equipment for the construction of two new 400 kV substations  
Skogssäter CT15 and CT16 and construction of the associated connecting TL
- 4 Rehabilitation of TL 380 kV Brigholmen
- 5 Construction of new SS 130 kV Porjusberket,  
entire electrical assembly works
- 6 Electrical installation works on TL 145 kV Kablifiering L26 Borlänge
- 7 Electric installation works on the TL 130 kV ML87 and  
TL 40 kV ML322 Frövifors (Korsnäs)
- 8 Electrical installation works on TL 145 kV VL48-Ed Klädsäcksmyren

**ISLAND ICELAND**

**1** Izgradnja nove HE Burfel 2, kompletni elektromontažni radovi na instalaciji elektroenergetskih i pomoćnih postrojenja

**1** Construction of new HPP Burfel 2, entire electrical assembly works on installation of electrical power and supporting systems

**NORVEŠKA NORWEY**

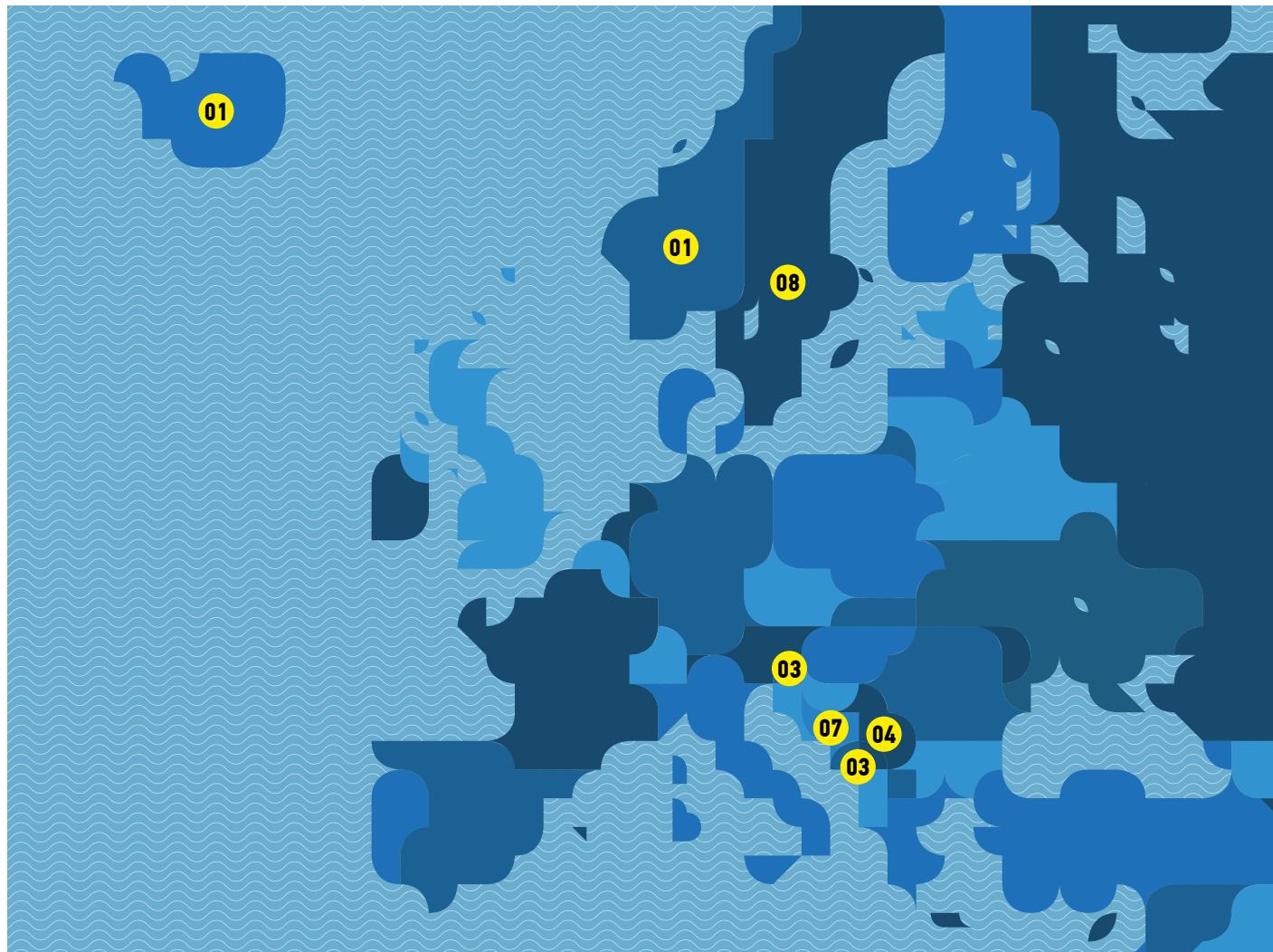
**1** Nord link HVDC Interconnector, elektromontažni radovi na izgradnji TS +/- 515 kV Tonstad

**1** Nord link HVDC Interconnector, electrical assembly works on construction of SS +/- 515 kV Tonstad

**SLOVENIJA SLOVENIA**

**1** Elektromontažni radovi u 110, 220 i 400 kV rasklopnom postrojenju za nadogradnju i rekonstrukciju TS Divača  
**2** Rekonstrukcija jednosistemskog DV 110 kV TS Pivka-EVP Pivka u dvosistemski dalekovod  
**3** Saniranje 20 kV dijela DV 110+20 kV Vuhred-Podvelka zbog havarije uzrokovane vjetrom

**1** Electrical installation works in 110, 220 and 400 kV switchyard facility for upgrading and reconstruction of SS Divača  
**2** Reconstruction of one-system TL 110 kV SS Pivka-TDC SS Pivka into two-way transmission line  
**3** Sanation of 20 kV part of the TL 110 + 20 kV Vuhred-Podvelka caused by wind damage



**ZAMISLITE MJESTO** gdje vas ujutro, čim prekoračite prag, prvo dočeka snažan šamar hladnog vjetra u lice. Tek par trenutaka nakon ovog brutalnog buđenja dobijate priliku da udahnete vazduh, nakon čega pred sobom vidite nepregledan horizont nemilosrdne pustinje.

Svakome ko je boravio u sjevernim islandskim predjelima je i više nego jasno zašto su upravo ove lokacije odabrane za pripreme astronauta prije prvih putovanja na Mjesec. Upravo na jednom od ovakvih mesta ekipe Elnos Grupe su prošlog ljeta i jeseni pomjerile granice mogućeg

**IMAGINE A PLACE** where, as soon as you go over threshold in the morning, you face with strong slap of cold wind first. Only few moments after this brutal wake up, you get a chance to breathe in, after what you get a view of endless of ruthless desert.

Anyone who experienced Northern Icelandic areas is more than clear why exactly these locations were chosen for preparation of astronomers before the first trips to the Moon. Elnos Group teams moved the limits of possible in one of these places last summer and autumn





# EKSTREMNI PODUHVAT ZAVRŠENA NEMOGUĆA MISIJA

EXTREME ENDEAVOR  
COMPLETED MISSION (IM)POSSIBLE

**SR** Smješteni u kontejnersko naselje udaljeno 30 kilometara od obale sjevernog Atlanskog okeana, daleko od bilo kog vida civilizacije, naša inženjersko-monterska ekipa je provodila dane realizujući projekat koji je podrazumijevao neprestanu borbu i saradnju sa prirodom.

## RAD U POLJIMA LAVE

Montiranje dalekovoda u poljima lave u radnim biografijama većine inženjera i montera dalekovoda se može smatrati više izuzetkom nego pravilom, a poduhvat Elnos Grupe je bio izvođen, velikim dijelom, upravo na jednom ovakovom mjestu. Radilo se u području nastalom na velikom rascjepu sjevernoameričke i evroazijiske ploče, a to je oblast vulkana Krafla i jezera Myvtan. Ovo je mjesto gdje je vulkanska aktivnost golim okom u Islandu i dalje najvidljivija. Prije nekoliko decenija, ljudi koji bi samoinicativno odlučili da kroče na ove teritorije je zaista mogla progutati živa lava. Danas su sjevernoislandska ohlađena polja lave zakonom zaštićeno prirodno blago i mjesto gdje rado dolaze avturisti iz cijelog svijeta.

I posao postavljanja dva dalekovoda řeistareykjalína 1 i Kröflulína 4, od samog početka je za nas bio velika avantura, jer iako smo do sada radili u nepristupačnim i ledom okovanim podnebljima, ovo područje je ipak bilo „sjeverno od sjevernijeg“ u odnosu na sva ostala mjesta gdje smo do sada bili.

Projekat je nalagao da narušavanje izgleda netaknutih polja lave bude svedeno na minimum, tako da su trasu novog dalekovoda zajedno, i sa velikom pažnjom, odredili predstavnici islandske elektroprivrede „Landsnet“ i

Agencije za zaštitu okoline Islanda. Nakon određivanja trase, radovi su bili u našim rukama.

## POD PRITISKOM

Borba za stvaranje balansa sa prirodom, borba sa surovim vremenom, sa rokovima, pred naše ljude su stavili zahtjev velike efikasnosti na više polja.

Postavljanje dalekovoda u poljima lave je, prije svega, zahtjevalo izgradnju servisnih puteva koji su sezali do svakog stubnog mjeseta. Ovaj dio posla je obavio „Landsnet“, dok je Elnos Grupa tokom nastavka projekta bila zadužena za njihovo održavanje. Tokom realizacije projekta, svako kretanje mehanizacije mimo ovih puteva je bilo strogo zabranjeno. I ne samo to.

„Razvlačenje radne sajle između stubova je moralo biti obavljano pješke. Rokovi su diktirali brz tempo rada, a u jednom danu su se smjenjivala sva četiri godišnja doba. Morali smo biti brzi, efikasni i spremni na sve“, rekao je Danijel Kontić, inženjer na ovom projektu.

Posao podizanja stubova, a na ovom potezu postavljano je devet različitih tipova, težine između 5,5 i 26 tona, što smo obavili uz pomoć krana.

Ekipe su postavile stubove čija je visina sezala do 21 metra. Iako gorostasi, svi stubovi su projektovani tako da bez obzira na veličinu budu što manje uočljivi u prirodi.

„Cilj projekta je bio da dalekovodna linija bude spremna za puštanje pod napon u oktobru, oko dva mjeseca prije planiranog početka rada njemačke fabrike industrijskog silikona ‘PCC’, za čije je potrebe najvećim dijelom projekat montaže novih dalekovoda i izvođen“, rekao je Davor



Ekipe Elnos podigle stubove visoke 21 metar  
Elnos teams erected 21 meter high towers

Purušić, stručni saradnik Elnos Grupe za tržište Islanda.

Po snijegu koji gotovo nikada ne prestaje da pada, vjetru koji konstantno duva, obazrivo pazeći na svaki nabor lave na terenu, ekipe Elnos Grupe su dan po dan pažljivo, korak po korak, i maksimalno organizovano išle ka konačnoj realizaciji zadatka. Ovo je bio jedini način da (ne) moguća misija bude okončana.

Projekat bi se u sportskom maniru mogao nazvati obaranje rekorda u trci sa preponama, jer su uslovi i rokovi od naših ekipa zahtijevali maksimalnu preciznost i praktičnost, ali i brzinu rada. Ipak, zahvaljujući istrajnosti i organizaciji, uspjeli smo. Naš hrabri tim je u zadatom roku montirao ukupno 192 dalekovodna stuba, i krajem oktobra se vratio kući.

„Znamo da nas je ‘Landsnet’ izabrao za ovaj zadatak zbog toga što smo u potpunosti svjesni u kojoj mjeri je bilo neophodno čuvati prirodu. Oni su zadovoljni time što smo pokazali maksimalno razumijevanje za njihovu situaciju i što smo im pomogli da ovaj posao realizuju na nabrojani mogući način“, rekao je Purušić.

## MAPA PROJEKTA

Dalekovod je građen u dva smjera, od nove geotermalne elektrane Þeistareykir, ka jugu i sjeveru. Sjeverni krak dalekovoda pod nazivom Þeistareykjalína 1, dug je 28 kilometara i spaja novu Þeistareykir sa industrijskom zonom Bakki, u kojoj se nalazi njemačka fabrika industrijskog silikona ‘PCC’. Drugi krak, pod nazivom Kröflulína 4, dug je 33 kilometra i spaja

elektranu sa starom geotermalnom elektranom Krafla. Ovaj krak uvezuje novu geotermalnu elektranu sa islandskim energetskim prstenom.

**EN** Accommodated in container village 30 kilometers away from the coast of North Atlantic Ocean, long afar any form of civilization, our engineering-fitters team spent many days performing the project that included constant fight and cooperation with nature.

## WORKING IN LAVA FIELDS

Assembling transmission lines in lava fields in CVs of most of engineers and fitters of transmission lines could be considered more exception than a rule, and Elnos Group endeavor was mostly performed in one of these locations. It was performed at the location of big gap of North American and Euro-Asian plate, and this is Volcano Krafla and Lake Myvatn area. This is a place where volcano activity in Iceland is the most evident to the naked eye. Several decades ago, people who decided to come to this area on their own could have easily been swallowed by gushing lava. Nowadays, North Icelandic cooled lava fields have been protected by law as natural wealth and as a place where adventure people from all over the world come to.

Setting up two transmission lines - Þeistareykjalína 1 and Kröflulína 4, from the very beginning was a big adventure for us as well. Although we had worked in inapproachable and icy areas, this area still was “Northern than North” compared to

all the other places we had been so far to.

Project defined that jeopardizing appearance of untouched lava fields has to be minimal, so that route of the new transmission line was carefully defined by representatives of Icelandic electrical power supply company “Landsnet” and Agency for protection of environment in Iceland. After defining the route, works were in our hands.

## UNDER PRESSURE

Fight for creating balance with nature, fight with harsh weather and deadlines faced our employees with request of great efficiency on many areas.

Setting up transmission lines in lava fields, first of all, demanded construction of maintenance roads going to each and every pole location. This part of work was performed by “Landsnet”, whereas Elnos Group was in charge of their maintenance as project continued. During project realization, each movement of mechanization away from these roads was strictly forbidden. And not only that:

“Stretching out of working rope between poles had to be down manually. Deadlines defined fast tempo, and in one day all four seasons switched. We had to be fast, efficient and ready for all”, said Danijel Kontić, this project engineer.

Works of setting up poles, and there were nine different types in this section weighing between 5.5 and 26 tons, we did with help of cranes.

Teams set up pole of up to 21 meters high. Although they are giants, all towers were desi-

gned so that, regardless its sizes, they are as little visible as possible in nature.

"The aim of the project was that transmission line be ready for commission under charge in October, about two months before the planned start of German factory for industrial silica 'PCC', and this project of new transmission lines was mostly performed for its needs", said Davor Purušić, Elnos Group professional associate for Icelandic market.

In the snow, which almost never stops, in the wind that constantly blows, carefully, watching out for each lava curve on the field, day by day, step by step, Elnos Group teams carefully and organized to maximum headed for the final rea-

lization of the project. This was the only way to end the mission (im)possible.

In sport terms, we could say the project bet the record in steeplechase, since conditions and deadlines requested maximum attention and practicality, as well as speed in work, from our teams. Nevertheless, we made it thanks to persistence and organization. Our brave team mounted 192 transmission line poles in requested deadline in total and by the end of October, they came back home.

"We know that 'Landsnet' chose us for this task since we were absolutely aware of the necessity to preserve nature. They are satisfied by the fact we showed maximum understanding for

their situation and we helped them perform this project in the best possible way", said Purušić.

## PROJECT MAP

Transmission line was built in two directions, from new geothermal power plant Þeistareykir towards South and North. North siding of the transmission line, titled Þeistareykjalína 1, is 28 kilometers long and connects new Þeistareykir with industrial zone Bakki, where German factory for industrial silica 'PCC', is located. The other siding, titled Kröflulína 4, is 33 kilometers long and connects power plant with old geothermal power plant Krafla. This siding connects new GPP with Icelandic electrical power ring.



**U KRATERU JEZERO, ISPOD NJEGA "PAKAO"**  
LAKE IN CRATER, "HELL" UNDERNEATH

Krater Viti je jedno od najupečatljivijih obilježja vulanskog područja Krafla. On je nastao nakon snažne erupcije vulkana Krafla 1724. godine, koja je trajala pet godina. Danas je njegova unutrašnjost ispunjena jezerom smaragdne boje promjera 320 metara, a staro islandsko vjerovanje kaže da se upravo ispod ovog kratera nalazi pakao. Inače, riječ Viti u prevodu sa islandskog znači upravo pakao. Turisti masovno posjećuju kao atrakciju njegove izvore sumpora koji ključaju i isparavaju. Ovi izvori spadaju u najaktivnije oblike vulkanizma na Islandu.

Crater Viti is one of the most impressive features of volcanic area Krafla. It was created after strong eruption of volcano Krafla in 1724, which lasted for five years. Today, there is a lake of emerald color inside of it, 320 meter in diameter, and it is an old Icelandic belief that the hell is exactly underneath. Namely, word Viti, once translated from Icelandic, actually means hell. Tourists visit it on a large number as an attraction due to its sulphur boiling and evaporating water. These springs belong to the most attractive forms of volcanism on Iceland.

## GLAVNI GRAD EVROPE ZA POSMATRANJE KITOVA EUROPEAN CAPITAL FOR WHALE WATCHING

Husavik, ili u prevodu Zaliv kuća, koji je za naše radnike na ovom projektu bio najbliže civilizacijsko odredište, gradiće je na istočnoj obali zaliva Skjálfandi na sjevernom Islandu. Popularno ga zovu glavni grad Evrope za posmatranje kitova. Turizam je glavna grana privrede u ovom gradiću koji svake godine posjeti više od 100.000 turista.

Gradić broji oko 2.300 stanovnika, a prema poznatoj knjizi naseljavanja Islanda, upravo on se smatra najstarijim islandskim naseljem.

Husavik, or House Gulf translated from Icelandic, which was the closest civilizational destination for our employees in this project, is a small town on Eastern coast of the gulf Skjálfandi on Northern Iceland. It is better known as European capital for whale watching. Tourism is a main branch of economy in this small town, which is visited by more than 100.000 tourists every year. Husavik has about 2,300 inhabitants, and, according to well-known book on Icelandic population, this city is the oldest Icelandic settlement.





TS 130/50 kV Linsankan SS 130/50 kV Linsankan

# Kad organizacija **POBIJEDI VISOKI RIZIK**

**When organizations beats high risk**

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*Obnovom starih postrojenja u Švedskoj, Elnos Grupa je potvrdila težnju ka ispisu novih ciljeva energetske budućnosti*

*Upgrading of old plants in Sweden, Elnos Group confirmed its tendency to record new aims of electrical power future*

**SR** Elnos Grupa je, kao partner Siemens-a, za potrebe jedne od vodećih švedskih energetskih kompanija E.ON Elnät Sverige AB, prošle godine uspješno realizovala još jedan poslovni izazov u Švedskoj.

Radi se o poduhvatu rekonstrukcije i nadogradnje trafostanica 130/50 kV Stavlo i 130/50 kV Linsankan na jugoistoku ove zemlje, te rekonstrukciji starog dalekovoda između njih.

Poznato je da realizacija svakog projekta iz oblasti energetike sa sobom nosi specifičnu terensku priču, pri čemu ni ovaj poduhvat ne predstavlja izuzetak.

Naime, trafostanice Stavlo i Linsankan pripa-

daju području grada Kalmar-a, jedna se nalazi na kopnu, dok je druga pozicionirana na susjednom ostrvu Oland. Zbog ovakvih geografskih uslova trafostanice su povezane dalekovodom, ali i podmorskim kablom.

Potrebu rekonstrukcije trafostanica i dalekovoda je nametnula sve veća popularnost ostrva Oland kao turističke destinacije, zbog čega je bilo neophodno uraditi modernizaciju 130 i 50 kV mreže.

Ekipe Elnos Grupe su izvršile rekonstrukciju obje trafostanice paralelno, i to dogradnjom više 130 i 50 kV polja, te zamjenom visokonaponskih (VN) aparat u dodatnih nekoliko polja. zajedno

sa zamjenom VN aparata, naši timovi su obavili kompletno postavljanje kabla i povezivanje sistema kontrole i zaštite polja.

Poseban izazov za Elnos Grupu u okviru ovog dijela projekta je predstavljalo polaganje podzemnog visokonaponskog kabla unutar trafo-stanice Stavlo. Uz polaganje VN kabla na ovom projektu, uspješno je ugrađeno šest kablovskih glava tipa TD 145 Kabeldon.

Elnos Grupa je bila zadužena i za rekonstrukciju 11 kilometara glavnog dalekovoda koji povezuje Oland sa kopnom. Jedan kilometar ovog dalekovoda je bio na ostrvu Oland, dok je ostatak na švedskom kopnu.

Ovaj dio projekta je za Elnos Grupu predstavljao veliki izazov, jer je modernizacija bila veoma kompleksna i rađena je po najvišim EU standardima.

Naime, instalacija OPGW užeta je morala da bude rađena na način da je jedna strana dalekovoda pod naponom, a druga ne, što je najopasniji vid izvođenja posla na dalekovodu. Upravo zbog toga za vrijeme izvođenja radova na ovom dalekovodu naše ekipe su svakodnevno primjenjivale najviše mјere obezbjeđenja i zaštite na radu.

Praktičnost i maksimalan stepen bezbjednosti prilikom izvršenja zadataka na terenu bile su ključne efektivne stavke, zahvaljujući kojima je ovaj projekat završen u planirane dvije etape, i prije predviđenog roka.

## BORAVAK U POZNATOJ TURISTIČKOJ DESTINACIJI

Ekipe naših radnika su za vrijeme obavljanja projektnih zadataka bile smještene u odmaraštu na ostrvu Oland, jednoj od najpoznatijih

turističkih destinacija na kome se nalazi više od 400 živopisnih vjetrenjača.

Prirodne ljepote ovog ostrva su zaposlenima na ovom projektu dale mogućnost da uživaju u čarima prekrasne prirode destinacije koja je jedno od najpopularnijih turističkih odredište Švedske u periodu godišnjih odmora.

**EN** For need of one of the leading Swedish electrical power companies, E.ON Elnät Sverige AB, Elnos Group, as a Siemens partner, successfully performed another business challenge in Sweden in 2017. It is reconstruction and upgrade of substations 130/50 kV Stavlo and 130/50 kV Linsankan at the South-East of this country, as well as reconstruction of old transmission line between them.

It is well known that performance of each project in the electrical power field carries its specific field story, and this endeavor is no exception, too.

Namely, substations Stavlo and Linsankan belong to Kalmar town area – one is located at the land whereas the other one is located on neighboring island Oland. Due to these geographic conditions, substations are connected by transmission line as well as underwater cable.

Need to reconstruct substations and transmission lines was imposed by even greater popularity of island Oland as a touristic resort, due to which it was necessary to modernize 130 and 50 kV networks.

Elnos Group teams reconstructed both substations simultaneously by upgrading more 130 and 50 kV bays, as well as replacing high-voltage (HV) devices in several added bays. Along with replacement of HV devices, our teams laid entire cable length and connect system of control and protection for bays.

Special challenge for Elnos Group in this part of the project was laying underground high-voltage cable inside substation Stavlo. Along with laying HV cable in this project, six cable terminations type TD 145 Kabeldon were installed successfully.

Elnos Group was in charge of reconstructing 11 kilometers of the main transmission line connecting Oland with land. One kilometer of this transmission line was on the island Oland, whereas the rest was on Swedish side land.

This part of the project was a big challenge for Elnos Group since modernization was very complex and performed complying with highest EU standards.

Namely, installation of OPGW rope had to be done in the way that one side of the transmission line was charged, and the other one not, which is the most dangerous form of performing works on transmission line. Due to this, during works performances on this transmission line, our teams applied higher measures of health and safety at work daily.

Practicality and maximum safety level during task performance on field were key effective facts, thanks to which this project was completed in two planned phases and before the planned deadline.

## RESIDING IN WELL KNOWN TOURISTIC RESORT

During tasks performance, our teams were accommodated in the resort of the island Oland, one of the most best known touristic resorts with more than 400 picturesque windmills.

Natural beauties of this island provided employees of this project with possibility to enjoy magic of wonderful nature of this resort, which is very popular touristic destination for Swedish during holidays.



Ostrvo Oland  
Oland island



Rekonstrukcija dvije trafostanice izvršena paralelno  
Simultaneous reconstruction of two substations

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## Kramforš kao izazov

Kramfors as a challenge

**SR** Realizacija rekonstrukcije čvorišta 130 kV trafostanice Kramforš, prvog projekta koji Elnos Grupa u Švedskoj radi po principu „ključ u ruke“, nastavljena je ove godine.

Poslovi Elnos Grupe na ovom projektu obuhvataju izvođenje kompletnih građevinskih i elektro radova na trafostanici i dalekovodu, a njegov krajnji cilj je rekonfigurisanje mreže ovog područja Švedske.

Inače, trafostanica Kramforš je veoma značajno čvorište 130 kV mreže u središnjem dijelu ove nordijske zemlje.

Konačna realizacija projekta Kramforš će obezbijediti sigurnije napajanje i mnogo napredniji i sigurniji sistem zaštite, kao i proširen sistem daljinskog upravljanja. Investitor projekta je kompanija E.ON Sverige AB.

**EN** Performance of reconstructing junction point 130 kV of the substation Kramfors - the first project that Elnos Group performs per "turn-key" principle in Sweden - has been continued this year as well. Elnos Group activities on this project include performance of all construction and electrical works of the substation and transmission line, and its final goal is re-configuration of network in this part of Sweden.

Likewise, Kramfors is one of very important junction point 130 kV of the network in central part of this Nordic country.

Final realization of the project Kramfors shall provide safer power supply and more improved and safer protection system, as well as expanded system of remote control. Investor of the project is company E.ON Sverige AB.



# Novo srce trafostanice Bileća

New heart for substation Bileća

**Bolja budućnost je pred onima koji energiju znaju čuvati, a ključ rješenja ovog nimalo lakog zadatka je u predanosti u ulaganje u obnovu starih energetskih postrojenja**

*Better future is for those who know how to preserve energy, and the key to this very hard task is lying in devotion to invest in reconstruction of old electrical power facilities*



TS 110/35/10 kV Bileća uspješno rekonstruisana  
Substation 110/35/10 kV Bileća successfully reconstructed

**SR** Projekat rekonstrukcije starog energetskog objekta trafostanice 110/35/10 kV Bileća, koji je okončan u junu 2017, jedan je od naših dobrih primjera rješavanja kompleksnog zadatka ovog tipa.

Trafostanica Bileća je ove godine navršila 60 godina postojanja, a još od početka svog rada ovaj energetski objekat nijednom nije prošao kroz ozbiljan projekat rekonstrukcije.

Elnos Grupa je dobila zadatak da sa liderske pozicije, u okviru konzorcijuma Elektroenergetika, predvodi sveobuhvatan poduhvat njene rekonstrukcije.

Projekat rekonstrukcije je obuhvatio 110 kV postrojenje trafostanice, te sanaciju njenih temelja i čeličnih konstrukcija.

Kroz postupak izvršenih radova rekonstrukcije, trafostanica Bileća je dobila u potpunosti nova 35 kV i 10 kV srednjenaonska postrojenja, transformator sopstvene potrošnje, te AC i DC podrazvode.

U okviru rekonstrukcije Elnos Grupa je obavila isporuku i ugradnju novog energetskog transformatora snage 20 MVA, koji je srce trafostanice Bileća.

Realizacijom ovog projekta prenosni odnos TS Bileća je povećan sa nazivnog napona 10 kV na 20 kV, tako da on sada iznosi 110/35/20 kV.

„Elektroenergetski objekat je modernizovan, veoma značajno je povećana pouzdanost elektroenergetskog sistema Hercegovine, a osnažena je srednjenaonska mreža okolnih mjesta

koja se napajaju iz trafostanice Bileća“, istakao je Nenad Vukomanović, rukovodilac divizije za TS u Elnos Grupi.

Značajno je i to da je kompletna rekonstrukcija trafostanice Bileća značila više od zamjene energetskih postrojenja, jer je u okviru poduhvata i njen komandno-pogonski objekat dobio novu fasadu, stolariju i krov.

## DALEKOVODNA VEZA ZA STOLAC

Trafostanica Bileća obezbjeđuje bitne veze 110 kV dalekovoda sa trafostanicama u Nikšiću, Gacku i Trebinju. Finalizacijom radova na rekonstrukciji, pored tri navedene veze formirana je i četvrta sa trafostanicom 110 kV Stolac.

**EN** Project of reconstructing old electrical power facility of substation 110/35/10 kV Bileća, which ended in June 2017, is one of our god examples how to solve complexity of this type of task.

This year, substation Bileća turned 60, and since its beginning, this electrical power facility has not undergone a serious reconstruction project once.

Elnos Group was tasked to be the leader of consortium Elektroenergetika, managing overall project of its reconstruction.

Reconstruction project covered 110 kV substation plant as well as rehabilitation of its foundations and steel constructions.

In performed reconstruction works, substation Bileća got all new 35 kV and 10 kV medium-voltage plants, transformer of its own consumption, as well as AC and DC sub-lines.

Within reconstruction, Elnos Group delivered and installed new electrical power 20 MVA transformer, which is the heart of the substation Bileća.

By realization of this type of project, transfer of SS Bileća has been increased from 10 kV nominal voltage to 20 kV, so it amounts to 110/35/20 kV now.

“Electrical power facility has been modernized, reliability of electrical power system of Herzegovina has been significantly increased, and medium voltage network of several surrounding places getting power from substation Bileća has been empowered”, said Nenad Vukomanović, head of division for SS in Elnos Group.

It is important to mention that entire reconstruction of the substation Bileća meant more than replacement of electrical power plant, since its control-power structure got new façade, joinery and roof.

## TRANSMISSION LINE FOR STOLAC

Substation Bileća provides important connections of 110 kV transmission lines with substations in Nikšić, Gacko and Trebinje. Ending reconstruction works, apart from three mentioned links, there was fourth one created with substation 110 kV Stolac.

# NOVA ENERGIJA ZA RAZVOJ INDUSTRIJSKE ZONE KRNJEŠEVCI

New energy for development of industrial zone Krnješevci



**Elnos BL Beograd po sistemu 'ključ u ruke' gradi trafostanicu 110/20 kV Krnješevci, u istoimenoj industrijskoj zoni. Nova trafostanica je novi vjetar u ledž za razvoj privrede i infrastrukture u regiji koja obuhvata Krnješevce, Šimanovce i bližu okolinu**

*Elnos BL Belgrade constructs a substation 110/20 kV Krnješevci in the industrial zone of the same name per 'turn-key' principle. New sub substation is a new tail wind for development of economy and infrastructure in the region including Krnješevci, Šimanovci and surroundings*



TS 110/20 kV Krnješevci se nalazi u neposrednoj blizini auto-puta Zagreb-Beograd  
SS 110/20 kV is located in direct proximity of highway Zagreb-Beograd

**SR** Sve brži razvoj industrijske zone Krnješevci, koja se prostire na 630 hektara u neposrednoj blizini auto-puta Zagreb-Beograd, nametnuo je potrebu stvaranja stabilnijeg i snažnijeg energetskog sistema na ovom području.

Obezbjedenje snažnijeg energetskog sistema u ovoj industrijskoj zoni je za EPS distribuciju znala donošenje odluke o izgradnji nove trafostanice 110/20 kV Krnješevci. Ovaj projekat je povjeren Elnosu BL Beograd, koji ga po sistemu 'ključ u ruke', treba okončati do marta 2018. godine.

"Trafostanica 110/20 kV Krnješevci će imati snagu od 30 megavata, sastoji se od jednog energetskog transformatora snage 31,5 MVA, jednog transformatorskog polja 110 kV, dva dalekovodna polja 110 kV, kompletног 20 kV postrojenja koje obuhvata 22 čelije, od čega je predviđeno da 15 čelija u budućnosti snabdijeva potrošače zona oko Krnješevaca", rekao je Sreten Čalasan, projektni inženjer Elnosa BL Beograd.

Trafostanica Krnješevci će električnom energijom napajati veliki broj firmi, ali i domaćinstava, i to ne samo u Krnješevcima, već i u susjednim Šimanovcima.

Izgradnja trafostanice Krnješevci je od velikog značaja za nastavak privrednog razvoja opštine Stara Pazova. Đorđe Radinović, predsjednik te opštine je rekao da su se s ciljem što efikasnijeg obavljanja projekta lokalne vlasti potrudile da obezbijede sve preduslove kako bi gradnja tekla što efikasnije.

„Početak rada trafostanice Krnješevci će rastetići trafostanicu u Novoj Pazovi, čiji kapaciteti će

biti preusmjereni na preostale tri industrijske zone koje su u velikoj ekspanziji", naglasio je Radinović i dodaо da će izgradnjom ove trafostanice biti stvoren uslov i za širenje industrijskih zona ove regije. On je podsjetio da u industrijskoj zoni u Krnješevcima, tzv. Južnoj radnoj zoni trenutno posluje oko 20 domaćih i stranih kompanija evropskog renomea.

Dragan Marin, direktor ogranka EPS distribucije Ruma je objasnio da će objekat u Krnješevcima biti izuzetno značajan za poboljšanje nivoa kvaliteta usluga ove kompanije.

„Vrijednost ove investicije, koja će pomoći daljem privrednom razvoju staropazovačke opštine je oko 2,5 miliona evra, ne računajući izgradnju priključnog dalekovoda", rekao je Marin.

**EN** Faster development of industrial zone Krnješevci, which covers 630 hectares in the vicinity of Highway Zagreb-Beograd, induced need for creating more reliable and stronger electrical power system in this area.

Provision of stronger electrical power system in this industrial zone made EPS distribution make a decision on constructing new substation 110/20 kV Krnješevci. Elnos BL Belgrade was tasked with this project. It is to be completed per 'turn-key' principle by the end of March this year.

“Substation 110/20 kV Krnješevci shall have 30 megawatts power, consisting of one electrical power 31.5 MVA transformer and one 110 kV transformer bay, two 110 kV transmission lines, entire 20 kV plant with 22 switchgears, out of which 15 switchgears are planned for providing consumers

around zone Krnješevci in the future", said Sreten Čalasan, Project Engineer from Elnos BL Belgrade.

Substation Krnješevci shall provide electrical power for big number of farms and homes as well, not only in Krnješevci, but also in neighboring Šimanovci.

“Construction works of substation almost are finished, and we still have works of oil pit of the transformer. Electrical works within the projects of constructing substation Krnješevci are also in their final phase and we have already started functional testing of the facility. We hope that by the end of the year we shall have performed external technical acceptance of the facility as well", said Sreten Čalasan, Project Engineer from Elnos BL Belgrade.

“Work start of substation Krnješevci shall unburden substation in Nova Pazova, whose capacity shall be directed to remaining three industrial zones in big expansion", said Radinović and added that construction of this substation shall create conditions for expanding industrial zones to these regions. He reminded that in industrial zone in Krnješevci, so called South work zone, there are about 20 national and international companies operating here, which are renowned in Europe.

Dragan Marin, Director of the branch for EPS distribution Ruma explained that facility in Krnješevci shall be extremely important for improvement of the service quality level of this company.

“Value of this investment, which shall support further development of the Municipality of Stara Pazova, amounts to € 2.5 million, construction of connecting transmission line excluded", said Marin.

# Trafostanica Gradiška 2 za bolji kvalitet napajanja

Substation Gradiška 2 - for better supply quality

**Trafostanica Gradiška 2 predstavlja jednu od važnih karika u stvaranju stabilne elektrifikacijske mreže dijela regije opštine Gradiška**

*Substation Gradiška 2 represents one of important links in creation of reliable electrification of network in a part of the Municipality of Gradiška area*



Radovi na TS 110/20 kV Gradiška 2 Works on SS 110/20 kV Gradiška 2

**SR** Elnos Grupa je, kao dio konzorcijuma Elektroenergetika, za investitora Elektroprenos BiH, učestvovala u projektu izgradnje nove trafostanice 110/20 kV Gradiška 2.

Realizacijom projekta izgradnje trafostanice Gradiška 2, elektroenergetska mreža je dobila novo postrojenje koje će obezbijediti sigurno i kvalitetno napajanje potrošača u dijelu opštine Gradiška i rasteretiti postojeću trafostanicu Gradiška 1.

Pored toga, trafostanica Gradiška 2 predstavlja jednu od važnih karika u stvaranju stabilne elektrifikacijske mreže za konzumno područje sjeverozapadnog dijela opštine Gradiška, njenog poteza uz auto-put Banjaluka–Gradiška i graničnog prelaza prema Hrvatskoj.

U okviru projekta izgradnje trafostanice Gradiška 2, Elnos Grupa je obavila radove montaže visokonaponske opreme.

Paralelno sa krajem elektromontažnih radova, dalekovodni tim Elnos Grupe je izvršio uvođenje dalekovoda Banjaluka 6–Gradiška 1 u trafostanicu Gradiška 2 po sistemu ulaz-izlaz.

Trafostanica Gradiška 2 se sastoji od dva dalekovodna, dva transformatorska i jednog mjerilog polja 110 kV. Veze lokalnog sistema sa terminalima zaštite i upravljanja, kao i sa sistemom daljinskog nadzora u trafostanici Banjaluka 6 i trafostanici Gradiška 1 su optičke.

Nakon završetka izgradnje u trafostanicu je ugrađen jedan transformator 110/20 kV, a ovaj projekat je podrazumijevao i montažu ormara zaštite i upravljanja.

Ormari zaštite i upravljanja su izrađeni u Elnosovoj elektromontažnoj radionici, a u njih su ugrađena najsavremenija rješenja ABB serije Relion procesne zaštite. Ormari su ugrađeni u komandnu prostoriju za smještaj svih ormara i lokalnog monitornog sistema, mikro SCADA, sa najsavremenijim rješenjima. Radovi su završeni u predviđenom roku, te je trafostanica puštena pod napon sredinom juna 2017. godine.

**EN** Being a part of consortium Elektroenergetika, Elnos Group participated in the project of constructing a new substation 110/20 kV Gradiška 2 for Investor Elektroprenos BiH.

Realization of the project for constructing substation Gradiška 2, electrical power network got a new plant to provide safe and quality supply of consumers of a part of the Municipality of Gradiška and unburden existing substation Gradiška 1.

Apart from this, substation Gradiška 2 represents another important link in creation of reliable electrification network for consumers in North-West area of the Municipality of Gradiška, its area from Highway Banja Luka–Gradiška and

border crossing with Croatia.

In the project of constructing substation Gradiška 2, Elnos Group performed assembly works of high-voltage equipment.

Simultaneously with completion of assembly works, transmission line team of Elnos Group performed installation of transmission line Banja Luka 6–Gradiška 1 in substation Gradiška 2 per entrance-exit system.

Substation Gradiška 2 consists of two transmission line, two transformer and one measuring bay 110 kV. Connections of local system with terminals for protection and control, as well as to the system of remote control in the substation Banja Luka 6 and substation Gradiška 1 are optical ones.

After completing construction, substation was installed with one 110/20 kV transformer, and this project also included assembly of protection and control cabinets.

Protection and control cabinets were made in Elnos electrical installation workshop, and these are installed with most modern solutions ABB series Relion process protection. Cabinets have been built in control room for storage of all cabinets and local monitoring system, micro SCADA, with state-of-art solutions. Works were performed in planned deadline and substation was commissioned mid-June 2017.

# Novi energetski kapacitet za TK centar Mtel

## New power capacities for TC center Mtel

**SR** Jedan od najvažnijih preduslova uspješnog poslovanja kompanija koje pružaju usluge milionskom broju korisnika je obezbjedenje kvalitetnog i kontinuiranog napajanja.

Upravo sa ciljem obezbjedenja sigurne, pouzdane i kvalitetne usluge mobilne telefonijske i internetske svojim korisnicima, kompanija Mtel je donijela odluku da je neophodno demontirati stari i ugraditi novi agregat u postrojenje TK centra u Banjaluci. Ovaj projektni zadatak je najvećim dijelom povjeren u ruke inženjera i montera Elnos Grupe.

U okviru projekta smo dobili zadatak da izvršimo građevinske radove. Projektnu dokumentaciju temelja neophodnog za postavljanje aggregata su napravili mlađi inženjeri Elnosa. Nakon izgradnje temelja uslijedio je jedan nov i specifičan izazov - postavljanje aggregata na temelj.

Pozicioniranje aggregata je bio dinamičan zahvat koji je zahtijevao i adekvatnu mehanizaciju. Praktičan duh naših radnika je i u okviru ovog poduhvata izšao u prvi plan, te je veliki agregat uz pomoć kamiona i dizalice, uz pravilno navođenje i rukovođenje, uspješno smješten na temelj.

Postavljeni aggregat ima sve karakteristike za podršku postrojenja TK centra Mtel-a.

"Agregat je instaliran sa ciljem obezbjedivanja većeg stepena samostalnosti rada prilikom eventualnog nestanka električne energije. Povezan je sa podzemnim rezervoarom čiji kapacitet iznosi jednu tonu. Potrošnja aggregata iznosi oko 170 l/h pri opterećenju od 75 odsto, dok njegov rezervoar ima kapacitet od 400 litara", objasnio je Mitar Vadić, inženjer angažovan na ovom projektu.

Uz ugrađeni aggregat je instaliran i sistem za automatsko dosipanje goriva u njegov rezervoar. Aggregat posjeduje i kontroler koji prati nivo goriva u rezervoaru.

**EN** One of the most important preconditions of successful business operations of companies pro-

viding services for millions of users is to provide good quality and continuous power supply.

In the aim of providing safe, reliable and good quality service of mobile telephony and Internet to its users, Mtel company made a decision it was necessary to disassemble old and install a new generator in the plant of TC center in Banja Luka. This project was mostly entrusted to engineers and fitters of Elnos Group.

In the frame of the project, we were entrusted a part of construction works. Design documentation for foundation necessary for setting generator up was made by engineers from Elnos.

After constructing foundation, there was a new and specific challenge ahead: setting generator up onto the foundation.

Generator positioning was a dynamic task demanding proper mechanization. Practical feature of our employees came out in the first plan

within this task as well. With help from a truck and crane, along with guidance and management, big generator was successfully placed on the foundation.

Set generator has all the features for supporting plant of TC center Mtel.

"Due to needs for providing necessary autonomy in work, this generator is connected to the existing underground reservoir of one ton capacity, which provided significantly bigger autonomy during electrical power cut. Likewise, consumption of this generator amounts to about 170 l/h in 75 per cent load, while the reservoir of the generator itself has capacity of 400 liters", explained Mitar Vadić, an engineer engaged in this project.

System for automatic top up of fuel to the generator reservoir was also installed along with generator. Generator also has a controller monitoring the fuel level in its reservoir.



Agregat uspješno pozicioniran na temelj Generator successfully mounted on foundation

# POD BUDNIM OKOM ŠTOKHOLMA

Under the watchful eye of Stockholm



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*Moderni Štokholm više ne želi da njegovo lice narušavaju stari dalekovodi koji prolaze kroz dvorišta, pored kuća, institucija, škola i naselja. "Dalekovodi moraju biti izmješteni iz urbanih dijelova grada", izričit je stav javnosti velike švedske i skandinavske prestonice.*

*Međutim, poduhvat uklanjanja velikih energetskih džinova u gusto naseljenim područjima veoma je kompleksan posao. Upravo na jednom ovakvom zadatku je Elnos Grupa potvrdila svoje znanje i iskustvo*

*Modern Stockholm does not want its look to be ruined by old transmission lines going through yards, next to houses, institutions, schools and settlements any longer. "Transmission lines have to be relocated from urban parts of the city", it is explicit standing point of the public in big Swedish and Scandinavian capital city. However, project of removing big old energetic giants in regions with big number of inhabitants is a very complex work. Elnos Group used such a task to prove its knowledge and experience*

**SR** Elnos Grupa je u zemlji koja kotira kao jedna od tehnološki najnaprednijih na svijetu, u zahtjevnom roku od mjesec dana i izuzetno složenim uslovima rada, uspješno okončala još jedan jedinstven projekat.

Novi poslovni izazov se odnosio na urbani dio Štokholma, u kome smo obavili demontažu sedam kilometara 220 kV starog dalekovoda KL 12 S-4.

Ovaj dalekovod je izgrađen davne 1936. godine, a najveći dio njegove trase prolazi kroz naselja švedske prestonice.

Razlog za realizaciju ovog projekta je ležao i u činjenici da standardi modernog života u ovoj zemlji nalažu da dalekovodne trase u što većoj mjeri zaobiđu gusto naseljene dijelove Švedske. Potreba za realizacijom projekta demontaže starog dalekovoda se nametnula i zbog činjenice da je on nakon izgradnje nove trafostanice Hatuna u potpunosti izgubio svoju funkciju.

Iako su ekipi Elnos Grupe do sada obavljale projekte sličnog tipa u urbanim sredinama, nikada do sada ovakve radove nisu izvodile u ovako velikoj evropskoj prestonici. Ovaj projekt za nas je predstavljao novi vid izazova.

Naime, naši radnici su se našli pod budnim okom građana koji su se kod predstavnika investitora, Svenske Kraftnat, interesovali za svaku fazu izvođenja radova. Potrudili smo se da za vrijeme rada u što manjoj mjeri ometamo njihovu životnu svakodnevnicu, u čemu smo, sudeći po kasnijim reakcijama, i uspjeli.

Naše ekipi su uložile sve napore u to da bezbjednost izvođenja radova bude na najvišem mogućem nivou, jer je trasa starog dalekovoda prolazila pored puteva, nekoliko škola, vrtića, dječjih igrališta i pješačkih staza.

Ovakvim pristupom smo potvrdili činjenicu da uvijek obezbjeđujemo najviši nivo zaštite radnika, kao i stanovnika, koliki god da je opseg prostora koji se štiti.

Elnos Grupa je u potpunosti izvela projekt uklanjanja dalekovoda KL 12, čija je ukupna dužina iznosila sedam kilometara. To znači da su naše ekipi na terenu demontirale svu zaštitnu užad i provodnike, kao i čeličnu konstrukciju dalekovodnih stubova.

Investitor projekta je bila kompanija Svenska Kraftnat, a nosilac ugovora kompanija Linjemontage i Grastop AB. Radovi su počeli 6. aprila, a Elnos Grupa ih je prema ugovorenoj dinamici okončala za mjesec dana. Na projektu su bila angažovana 34 radnika.

## RADNICI FOTOGRAFISANI NA SVAKOM ČOŠKU

Zanimljivo je da je za vrijeme realizacije ovog projekta kompanija koja je nadzirala radove



**Demontiran dalekovod star više od 80 godina**  
Dismantling of a more than 80 year old transmission line

od građana Štokholma dobijala i po 200 fotografija naših radnika na terenu. Iako su našim operativcima ovakve okolnosti bile malo neobične, objašnjeno nam je da švedska gradanska inicijativa funkcioniše tako da svaki projekt od značaja građani "prate u stopu". Naši radnici su sa osmijehom prihvatali ovakav običaj i svoj posao okončali revnosno i u roku.

**EN** Elnos Group successfully completed another unique project in the country regarded as one of technologically most advanced in the world, in a demanding 30-days deadline and extremely complex working conditions.

New business challenge referred urban part of Stockholm, where we dismantled seven kilometers of 220 kV old transmission line KL 12 S-4.

This transmission line was built as far as in 1936, and biggest part of its route goes through inhabited part of the Swedish capital city.

Reason for realization of this project also was the fact that standards of modern life in this country request that transmission lines routes bypass as much as possible heavily populated part of Sweden. Need for realization of dismounting old transmission line also imposed due to the fact that it completely lost its function after constructing new substation Hatuna.

Although Elnos Group teams have performed similar projects in urban environments by now, they have never performed such activities in this size of European capital city. This project was a new type of challenge for us.

Namely, our employees were under watchful eyes of citizens, who expressed their interest for each works performance phase at repre-

sentatives of the Investor, Svenska Kraftnat. During works performance, we did our best not to disturb their everyday life, which, judging from their reactions later on was success.

Our teams did their best that safety in work performance gets to the highest level possible, since the route of old transmission line was going next to the roads, several schools, kindergartens, playgrounds and sand paths.

This approach confirmed the fact that we always provide the highest level of protection for employees, as well as population, whatever the area protected is.

Elnos Group completely performed the project of removing transmission line KL 12, whose total length was 7 kilometers. This means that our teams on the field dismantled all protective ropes and conductors, as well as steel structure of transmission line poles.

Project Investor was company Svenska Kraftnat, and Leader of the contract were company Linjemontage and Grastop AB. Works started on April 6 and Elnos Group ended them in a month, just in period contracted in time schedule. 34 employees were engaged in the project.

## EMPLOYEES PHOTOGRAPHED AT EACH THEIR STEP

It is interesting to mention that during project realization, company supervising the works of our employees got as many as 200 photos of our employees on the field from Stockholm inhabitants. Although our contractors found these circumstances a bit unusual, we were explained that Swedish city initiative functions in the way that citizens follow "each step" of important project. Our employees welcomed this custom with smile and performed their work diligently and timely.



**Rad u gusto naseljenom području**  
Working in a densely populated area

JAČANJE NACIONALNE  
**MREŽE**  
**ŠVEDSKE**

Strengthening Swedish national grid



**SR** Jačanje elektroenergetske nacionalne mreže Švedske je zadatak na kome rade sve njene vodeće energetske kompanije i sistem operatori. Naime, središnja Švedska proizvodi sve više električne energije koju nacionalna mreža mora prihvati. Da bi se ova električna energija sigurno prenijela konsnicima, neophodno je jačanje nacionalne mreže. Aktivni učesnik u ovom velikom, značajnom zadatku je i Elnos Grupa.

## VRHUNSKA OPERATIVNOST ZA NOVI REKORD

Prvu kariku u jačanju nacionalne mreže u 2017. napravili smo na projektu dalekovoda Ostansio-Alberg. Naš zadatak je bio izgradnja novog dvosistemskog 130 kV dalekovoda za povezivanje novoizgradene trafostanice Ostansio sa postojećom trafostanicom Alberg i rekonstrukcija dalekovoda između postojećih trafostanica Talle i Alberg.

Projekat je imao niz specifičnosti, zbog kojih su bili neophodni vrhunsku organizaciju i operativnost naša 22 radnika. Imali smo veliki obim posla koji je bilo potrebno izvršiti u kratkom periodu, i to noću. Stubovi su bili izuzetno gabaritni, u projektu 20 i više tona po stubu. Instalirali smo provodnik velikog presjeka, 910 mm<sup>2</sup>, koji se na našim područjima ne instalira. Pred našom ekipom su bila dva mjeseca vrlo zahtjevnog rada, a poslovi su uspješno okončani u junu.

Ipak, po visokom stepenu zahtjevnosti, rukovodilac radova Elnos Grupe Slobodan Mičić izdvojio je jednu noć u kojoj je bio bitan svaki minut. „Na jednom dijelu trase morali smo obaviti elektromontažne radove preko izuzetno prometne pruge, koja ima osam tračnica i šira je od 140 m. Za ove radove je isključenje energije na pruzi najavljenog godinu i pol dana ranije. Dobili smo rok od 4,5 sata da uradimo taj posao, jer je pruga samo u tom periodu mogla biti isključena. Mi smo posao obavili za tri sata, a inače je po standardnim normativima za njegovo obavljanje potreban jedan radni dan. Upravo zbog toga smo dobili velike pohvale od krajnjeg investitora Vatenfall-a. Čak je i jedan od direktora Vatenfall-a došao u četiri sata ujutro, nakon obavljenog posla, i donio kafu i kolače našim radnicima“, rekao je Mičić.

## IZGRADNJA I MONTAŽA GIGANTA

Novu kariku u jačanju nacionalne mreže u 2017. napravili smo na projektu rekonstrukcije i uvodenja tri dalekovoda u novu 400 kV trafostanicu Karlslund.

Projekat nam je povjerio dugogodišnji partner, kompanija Linjemontage i Grastorp AB. Naš posao je obuhvatao demontažu i podizanje 18 novih dalekovodnih stubova, elektromontažne radove na instalaciji provodnika i uvođenje dalekovoda u novoizgradenu trafostanicu. Preciznije govoreći, radi se o rekonstrukciji dva dalekovoda naponskog nivoa 400 kV i jednog dalekovoda 130 kV.

„Ovaj projekat je poseban zbog toga što su na 400 kV dalekovodima bili specijalni tipovi stubova, teški

od 50 do 70 tona. Ti stubovi su, praktično, giganti“, rekao je rukovodilac radova Elnos Grupe Slobodan Mičić. U okviru projekta smo takođe izgradili novi dvosistemski 130 kV dalekovod, čija je jedna strana u vlasništvu Svenska Kraftnat-a, a druga u vlasništvu Vatenfall-a.

Radovi su izvođeni u otežanim uslovima, na temperaturi nižoj od minus 10°C. „Teški uslovi rada na terenu kompenzovani su dobrim smještajem u dvije velike kuće, od kojih jedna ima veliki restoran i profesionalnu kuhinju. Tu smo spremali svoju hrana, tako da su uslovi za svakodnevni život radnika bili sasvim dobri“, rekao je Mičić.

Projekat je završen krajem godine demontažom oko 10 kilometara 130 kV dalekovoda, koji je izgradnjom novog postao suvišan. Investitor projekta je kompanija Svenska Kraftnat.

## SPECIJALNA MEHANIZACIJA

INTERESANTNO JE DA SMO UZ NAŠE  
SAVREMENE MAŠINE I MEHANIZACIJU, ZBOG  
SPECIFIČNOSTI RADOVA, KRATKIH ROKOVA  
I OBEZBJEDENJA GRADILIŠTA, KORISTILI  
ČETIRI MOBILNA KRANA, KAO I SPECIJALNE  
SKAJ LIFTOVE.

**EN** Strengthening electrical power Swedish national grid is a task all the leading electrical power companies and system operators are working on. Namely, central Sweden produces more and more electrical power that national grid has to receive. In order for this electrical power to be transferred safely to the users, it is necessary to strengthen the national grid. Elnos Group is an active participant in this big and significant project as well.

## TOP OPERATION FOR NEW RECORD

We made the first link of strengthening the national grid in 2017 on the project of transmission line Ostansio–Alberg. Our task was to construct new two-system 130 kV transmission line for connecting newly-constructed substation Ostansio with the existing substation Alberg, and reconstruction of transmission line between the existing substations Talle and Alberg.

Project had a series of specific features due to which we had to have top organization and readiness of our 22 employees. We had a big scope of work to do in a very short period of time at night. Towers were of extreme dimensions – in average over 20 tons per a tower. We installed conductor of large diameter, 910 mm<sup>2</sup>, which is not normally installed in our regions. Our team had two months of a very demanding work and activities were completed successfully in June.

However, having a high degree of demanding complexity, Slobodan Mičić, Site Manager from Elnos Group, set aside one night in which each minute

mattered. “In one part of the route, we had to perform electrical assembly works over a railway of very big traffic, which has eight railways and is wider than 140 m. In order to perform these works, power cut offs were announced eighteen months in advance. We were given a deadline of 4 hours and 30 minutes to perform the works since the railway could have been disconnected only in this period. We performed the works in three hours. Normally, in standard norms, we would need a day for its performance. Due to this, we were praised very much from the end Investor Vatenfall. Even one of the Directors from Vatenfall came at four in the morning, after the work was done, and brought coffee and cakes for our people”, said Mičić.

## CONSTRUCTING AND MOUNTING GIANT

New made a new link in strengthening the national grid in 2017 in the project of reconstruction and introduction of three transmission lines in new 400 kV substation Karlslund.

We were entrusted with this project by long-term partner, company Linjemontage and Grastorp AB. Our work covered dismantling and erecting 18 new transmission lines poles, electrical assembly works of conductor installations and installation of transmission line into newly build substation. To be precise, this is reconstruction of two transmission lines of 400 kV voltage level and one 130 kV transmission line.

“This project is special because 400 kV transmission lines had special types of poles weighing 50 to 70 tons. These poles practically are giants”, said Slobodan Mičić, the Manager of the works from Elnos Group. In the frame of the project, we also constructed new two-system 130 kV transmission line, whose one part is owned by Svenska Kraftnat and other part is owned by Vatenfall.

Works were performed in aggravated conditions in temperatures lower than minus 10°C. “Difficult working conditions on the field were compensated by good accommodation in two big houses, one of which has a big restaurant and professional kitchen. Here, we prepared our food, so that conditions for everyday life of the employees were pretty good”, said Mičić.

Project was completed by the end of the year by dismantling 10 kilometers of 130 kV transmission line which became obsolete once the new one was built. Project Investor was company Svenska Kraftnat.

## SPECIAL MECHANIZATION

IT IS INTERESTING THAT WE, WITH OUR MODERN MACHINES AND MECHANIZATION, DUE TO SPECIFIC FEATURES OF THE WORKS, SHORT DEADLINES AND SITE SAFETY, USED FOUR MOBILE CRANES AS WELL AS SPECIAL SKY ELEVATORS.

A photograph of a utility worker in safety gear, including a white hard hat, a dark long-sleeved shirt, and a bright yellow high-visibility vest, climbing a tall metal utility pole. The worker is secured with a red safety lanyard and is holding onto a rope. The background shows a clear blue sky and some green foliage.

DALEKOVODI  
**ZA ENERGETSKU  
BUDUĆNOST  
SLOVENIJE**

Transmission lines for Slovenian energy future

**SR** Timovi Elnos Grupe i njene slovenačke članice ENS, uspješno su realizovali nove projekte izgradnje i rekonstrukcije dalekovoda u Sloveniji.

Radi se o projektima rekonstrukcije dalekovoda 110 kV Logatec–Žiri u središnjem dijelu Slovenije i o izgradnji novog dalekovoda 2×110 kV TS Bršljin–TS Gotna vas u Novom Mestu.

Uspješna realizacija ovih projekata ima veliki značaj, jer se radilo o angažmanu za Elektro Ljubljano, najveću distributivnu mrežu Slovenije, koja obezbeđuje električnu energiju za više od 330.000 kupaca. Nosilac ugovora kod oba projekta je bila ljubljanska partnerska kompanija C&G.

## IZGRADNJA NOVOG DALEKOVOUDA 2×110 kV TS BRŠLJIN–TS GOTNA VAS

Izgradnja novog dalekovoda 2×110 kV TS Bršljin–TS Gotna vas u Novom Mestu u Sloveniji je prvi projekat Elnos Grupe u toj zemlji. Iako posjedujemo bogato internacionalno iskustvo i status lidera u realizaciji projekata ovog tipa, tržište Slovenije je za nas bilo nov i poseban izazov.

Kroz njegovu realizaciju, ekipe na terenu su potvrdile da sve radeve izvode u skladu sa pravilima struke i uz poštovanje ugovorene dinamike. Zanimljivo je da su u okviru ovog projekta naši timovi montirali pet različitih vrsta stubova.

Izgradnjom dvostrukog dalekovoda na 110 kV naponskom nivou, povezane su trafostanice Bršljin i Gotna vas i omogućen je priključak na još dvije trafostanice, Ločna i Cikava.

## DALEKOvod 110 kV LOGATEC–ŽIRI

Rekonstrukcija dalekovoda 110 kV Logatec–Žiri je obuhvatala poslove montaže i podizanja 72 dvosistemska stuba. Osnovni cilj projekta je bio da se osigura sigurno i kvalitetno snabdijevanje korisnika električnom energijom, nakon što je ovaj dalekovod u nevremenu pretrpio havariju.

Uprkos tome što brdovit teren i zimski vremenski uslovi nikako nisu išli u prilog realizaciji poslova, projekat je veoma uspješno okončan. Montirano je nekoliko različitih tipova stubova.

“Ovo je bio projekat kakav možemo poželjeti. Ostvarili smo odličnu saradnju sa predstavnicima investitora. Posebno moram pohvaliti sve naše radnike, koji su sa velikim entuzijazmom izvodili radeve i zaslužni su za zadovoljstvo naručioča”, rekao je vođa ovog projekta u ime ENS-a, Bojan Gale.

Zadovoljstvo zbog dobro obavljenog posla nisu krili ni u Elektro Ljubljani.

“Radovi su se izvodili uz obostrano zadovoljstvo, naručioča i izvođača. Sva otvorena pitanja smo rješavali brzo i efikasno. Zbog toga, i ubuduće želimo saradnju sa izvođačima kao što su Elnos Grupa i Elektro novi sistemi”, potvrdio je vođa projekta u ime Elektro Ljubljane.



110 kV dalekovodom smo povezali TS Bršljin i TS Gotna vas  
110 kV transmission line connecting substations Bršljin and Gotna vas

**EN** Elnos Group teams and teams of its new Slovenian member – ENS – successfully performed new projects of construction and reconstruction of transmission lines in Slovenia.

These are projects of reconstruction transmission lines 110 kV Logatec–Žiri in central Slovenia and construction of new transmission line 2×110 kV TS Bršljin–TS Gotna vas in Novo Mesto. Successful realization of these projects is very important, since this was performed within engagement for Elektro Ljubljana, the biggest distribution network of Slovenia, which is providing electrical power for more than 330,000 buyers. Leader of the contract for both projects for partner company C&G from Ljubljana.

## CONSTRUCTION OF NEW TRANSMISSION LINE 2×110 kV SS BRŠLJIN–SS GOTNA VAS

Construction of new transmission line 2×110 kV SS Bršljin–SS Gotna vas in Novo Mesto in Slovenia is the first project of Elnos Group in this country. Although we have rich international experience and leader status in performing projects of this kind, Slovenian market was a new and special challenge for us.

During its realization, field teams confirmed that all the works were performed in line with professional rules and obeying contracted time schedule. It is interesting to mention that our teams mounted five different types of towers in the frame of this project.

By construction of double transmission line on 110 kV voltage level, substations Bršljin and Gotna vas were connected and it provided connection to two more substations - Ločna and Cikava.

## TRANSMISSION LINE 110 kV LOGATEC–ŽIRI

Reconstruction of transmission line 110 kV Logatec–Žiri included mounting and erecting 72 two-system towers. Basic aim of the project was to provide safe and good quality electrical power supply for users after this transmission line suffered crash in bad weather.

In spite of the fact this is a hilly area and winter weather conditions did not support works performance in any way, project was successfully completed. Several types of poles were mounted.

“This was a project we could only wish for. We accomplished great cooperation with Investor representatives. I have to praise our employees in the first place, who performed the works enthusiastically and are to thank for satisfaction of the Employer”, said Bojan Gale, the Project Manager, on behalf of ENS. Satisfaction for well-done work was expressed in Elektro Ljubljana as well.

“Works were performed for satisfaction of both Employer and Contractor. We resolved all the open questions quickly and efficiently. Due to this, in future we wish to have cooperation with contractors such as Elnos Group and Elektro novi sistemi”, confirmed Project Manager on behalf of Elektro Ljubljana.

# USPJEŠNI PODUHVATI

NA POTEZU  
JESENICE-KRANJSKA GORA

Successful endeavors on section  
Jesenice-Kranjska Gora





**Kompanija ENS je uspješno okončala dva zahtjevna projekta na dalekovodu Jesenice-Kranjska Gora, za Elektro Gorenjsku, preduzeće koje obavlja distribuciju električne energije za više od 87.000 korisnika na području sjeverozapadne Slovenije**

*Company ENS successfully completed two demanding projects of transmission line Jesenice-Kranjska Gora, for Elektro Gorenjska, company distributing electrical power for more than 87,000 users for the area of North-West Slovenia*

#### **SR POD PRITISKOM VISOKIH ZAHTJEVA**

U okviru prvog projekta bilo je potrebno izvršiti djelimičnu demontažu dalekovoda Jesenice-Kranjska Gora. U pitanju je bio poduhvat u okviru kojeg su vrhunski monteri ENS-a izvršili demontažu 31 stuba srednjenačnog dalekovoda.

Izvođenje ove demontaže je bio istinski podvig, jer dalekovod Jesenice-Kranjska Gora prolazi Gornjesavskom dolinom, što je u tolikoj mjeri nepristupačan predio da su neki stubovi morali biti ručno demontirani.

Posmatrano iz ugla bezbjednosti, kako radnika tako i lokalnog stanovništva, ovaj projekat je bio jako zahtjevan jer su u određenim fazama radovi izvođeni u blizini puteva i naselja.

Najveću odgovornost u ovom zadatku nosio je naš glavni poslovodja Martin Bizjak, koji je sve vri-

jeme upozoravao radnike i brinuo se o tome da oni prilikom rušenja stubova ne budu ugroženi.

Nakon obavljanja demontaže, dijelovi starih dalekovoda su uz pomoć improvizovane žičare spuštani do mjesta sa kojeg je konstrukciju bilo moguće transportovati do privremene deponije.

#### **DIO VELIKOG PROJEKTA**

Drugi projekat se odnosio na podizanje poligonalnih stubova i izvođenje elektromontažnih radova na dijelu istog dalekovoda.

Postavljanje poligonalnih stubova se izvodi mnogo većom brzinom nego postavljanje klasičnih rešetkastih stubova, tako da ove radove izvode manje ekipe montera.

Radovi montaže su obavljani u Gornjesavskoj dolini, na području Julijskih Alpi, u periodu godine koji nije omotao aktuelne poljoprivredne radove i turističku sezonu.

Ovdje smo bili dio zanimljivog projekta čija realizacija, dio po dio, traje već nekoliko godina.

Za tri godine, koliko bi projekat trebao da traje, ovaj dalekovod će biti prvi u Sloveniji koji će u cijelosti biti izrađen na poligonalnim stubovima.

U ovom trenutku dalekovod još uvijek radi na 35 kV, ali će nakon završetka svih radova raditi na naponskom nivou od 110 kV.

#### **EN PRESSURED BY HIGH DEMANDS**

In the frame of the first project, we had to perform partial dismount of transmission line Jesenice-Kranjska Gora. This was a project where top fitters of ENS dismantled 31 tower of middle-voltage transmission line.

This dismantling was a true endeavor since transmission line Jesenice-Kranjska Gora goes through Gornjesavska Valley, which is so in-

approachable area that some poles had to be dismounted by hand.

As for safety, both employees and locals, this project was extremely demanding since in certain stages works had been performed in the vicinity of roads and settlements.

Martin Bizjak, our main manager carries the biggest responsibility and warned employees all the time, took care of their safety while drilling the poles.

After dismounting, parts of old transmission lines, supported by improvised ropeway, were taken to the places from where the structure could have been transported to temporary waste dump.

#### **A PART OF BIG PROJECT**

The second project referred to erecting polygonal poles and performance of electrical mounting works in a part of the same transmission line.

Erecting polygonal poles is performed at much bigger speed than erecting classic grid poles so these works are performed by teams with smaller number of fitters.

Mounting works were performed in Gornjesavska Valley in the area of Julian Alps in the period of the year that did not disturb current agricultural works and touristic season.

Here, we were a part of an interesting project whose realization, a bit by bit, has been lasting for several years now.

In three years, which should be project duration, this transmission line shall have been the first completely built on polygonal towers in Slovenia.

At this moment, transmission line still works on 35 kV, but, after completion of all works, it shall work on 110 kV voltage level.



**Dalekovodi morali biti demontirani ručno**  
Manual dismantling of transmission lines



**DV Jesenice-Kranjska Gora**  
TL Jesenice-Kranjska Gora

# Na pragu Koridora 10

On the threshold of Corridor 10



**Projekat uspješno realizovan uprkos vremenskim neprilikama**  
Project implemented successfully despite adverse weather conditions

**SR** Makedonska članica Elnos Grupe, kompanija Elnos BL Skoplje, uspješno je realizovala projekt rekonstrukcije dijela 400 kV dalekovoda od trafostanice Dubrovo do makedonsko-grčke granice.

Rekonstrukcija ovog dijela dalekovoda je stvorila uslove za dugo očekivano puštanje u saobraćaj dionice panevropskog Koridora 10, na potezu od Demir Kapije do Smokvice, dugoj 28,2 kilometra.

Najveći izazov za naš tim na terenu je predstavljao kratak rok izvođenja radova, koji je nametnula neophodnost isključenja međunarodnog dalekovoda za vrijeme realizacije ovog projekta.

Ipak, zahvaljujući dobroj organizaciji, naša

ekipa je uspješno izvršila sve radove u ugovorom predvidenom roku. Demontaža dijela postojećeg 400 kV dalekovoda je obavljena u roku od 15 dana. Montaža četiri nova dalekovodna stuba, uz koju je izvršeno i izmještanje kompletne dalekovodne trase, okončana je u roku od mjesec dana.

Ovaj projekt je specifičan zbog ispunjavanja tehničkih propisa i vazduhoplovnih regulativa za dalekovode koji se ukrštaju sa auto-putevima. Zbog toga je novi dalekovod viši, stubovi su ofarbani po zahtjevima pomenute regulative, između njih su postavljene kugle za obilježavanje, a na vrhove stubova su instalirane svjetiljke.

Za vrijeme realizacije projekta, novembarske vremenske prilike nikako nisu išle "naruku" našim monterima. Naime, lokacija izvođenja

radova je poznata po snažnim vjetrovima koji su zajedno sa kišom pravili dosta problema prilikom podizanja dalekovodnih stubova, a kasnije i njihovog farbanja. Zahvaljujući profesionalizmu i velikom iskustvu, naše ekipe su se uspješno izborile i sa ovim problemima.

Ugovor za implementaciju rekonstrukcije dijela 400 kV dalekovoda od trafostanice Dubrovo do makedonsko-grčke granice je prvi projekat koji je Elnos BL Skoplje realizovala za grčku kompaniju „Aktor“ ADT.

## MEDUNARODNI ZNAČAJ

Koridor 10 je jedan od panevropskih saobraćajnih koridora i prolazi kroz veliki broj država bivše Jugoslavije: Sloveniju, Hrvatsku, Srbiju i

Makedoniju. Glavna trasa koridora kreće iz Salzburga, a zatim prolazi kroz Ljubljana, Zagreb, Beograd, Niš, Skoplje, Veles i završava u Solunu. Radi se o projektu od velikog međunarodnog značaja, koji će imati višestruko pozitivan uticaj na komercijalne i trgovinske aktivnosti u regionu i doprinijeti regionalnom razvoju i koheziji šireg područja Balkana.

#### USPJEŠNO REALIZOVANA ISPORUKA ZA MEPSO

ELNOS BL BEOGRAD JE KAO VODEĆI PARTNER U OKVIRU KONZORCIJUMA SA KOMPANIJOM „KONČAR TRANSFORMATORI“ IZ ZAGREBA, USPJEŠNO REALIZOVAO UGOVOR O ISPORUCI VISOKONAPONSKIE OPREME MAKEDONSKOM ELEKTROPRENOSNOM SISTEM OPERATORU (MEPSO).

U PITANJU JE BILA PRVA U NIZU ISPORUKA ZA PROJEKAT REVITALIZACIJE I MODERNIZACIJE PRENOSNE MREŽE U MAKEDONIJI, KOJI SE REALIZUJU U KREDITNOM ARANŽMANU SA EBRD-OM. UGOVOR JE PODRAZUMIJEVAO NABAVKU I ISPORUKU PRIMARNE VISOKONAPONSKIE OPREME ZA MODERNIZACIJU TRAFOSTANICA NAPONSKOG NIVOA 400 I 110 KV.

**EN** Macedonian member of Elnos Group, company Elnos BL Skopje, successfully realized project of reconstructing a part of 400 kV transmission line from substation Dubrovo to Macedonian-Greek border.



Reconstruction of this part of the transmission line created conditions for long-expected commission of a section of Pan-European Corridor 10, from Demir Kapija to Smokvica, 28.2 kilometers long.

The biggest challenge for our field team was a short deadline for works performance, which imposed necessity to switching off international transmission line during this project performance.

However, thanks to good organization, our team successfully managed to perform everything in contacted deadline. Dismantling the existing 400 kV transmission line was performed in 15 days. Mounting of four new transmission lines with dislocating entire transmission line section was performed in a month.

This project is specific due to meeting technical regulations and air traffic regulations for transmission lines crossing with highways. Due to this, new transmission line is higher, poles are painted in line with mentioned regulations, marking balls are set between them, and lamps were installed on the top of poles.

During project realization, November weather conditions were not in favor to our fitters. Namely, site is known for strong winds, which, followed by rain, caused lot of problems in erecting transmission poles and their painting afterwards. Thanks to professionalism and major experience, our teams successfully fought these problems.

Contract for implementation of reconstructing a part of 400 kV transmission line from substation Dubrovo to Macedonian-Greek border is

the first project Elnos BL Skopje performed for Greek company "Aktor" ADT.

#### INTERNATIONAL IMPORTANCE

Corridor 10 is one of Pan-European traffic corridors and it goes through most of former Yugoslavia states: Slovenia, Croatia, Serbia and Macedonia. The main route of corridor starts from Salzburg, and then goes through Ljubljana, Zagreb, Belgrade, Niš, Skoplje, Veles and ends in Thessalonica. This is a project of big international significance, which is going to have multiple impacts on commercial and trading activities in the region and contribute regional development and cohesion of wider Balkan area.

#### SUCCESSFULLY PERFORMED DELIVERY FOR MEPSO

ELNOS BL BELGRADE, BEING LEADING PARTNER IN THE FRAME OF CONSORTIUM OF THE COMPANY “KONČAR TRANSFORMERS” FROM ZAGREB, SUCCESSFULLY PERFORMED THE CONTRACT ON DELIVERY OF HIGH VOLTAGE EQUIPMENT TO MACEDONIAN ELECTRICAL TRANSFER SYSTEM OPERATOR (MEPSO). THIS IS ONE OF A SERIES OF DELIVERIES FOR PROJECT OF REVITALIZATION AND MODERNIZATION OF TRANSFER NETWORK IN MACEDONIA, BEING PERFORMED IN CREDIT ARRANGEMENT WITH EBRD. CONTRACT INCLUDED PURCHASE AND DELIVERY OF PRIMARY HIGH VOLTAGE EQUIPMENT OF MODERNIZING SUBSTATIONS OF VOLTAGE LEVEL 400 AND 110 KV.



Ispunili smo preduslov za puštanje dijela Koridora 10 u saobraćaj  
Prerequisite for opening of traffic on part of Corridor 10 fulfilled

# Elnos Grupa karika izgradnje vjetroparka Krnovo

Elnos Group as a construction link of Wind Farm Krnovo

**SR** Timovi Elnos Grupe su još jednom potvrdili da poslove postavljanja OPGW-a na nepristupačnim predjelima Crne Gore obavljaju bez preanca.

Svoju stručnost u ovoj oblasti smo ovaj put dokazali u okviru prošlogodišnjeg projekta rekonstrukcije dalekovoda 110 kV Kličev-Breznica.

Naš zadatak je bio da na 25 kilometara dugoj trasi ovog dalekovoda izvršimo postavljanje OPGW-a sa pripadajućom opremom, ali i da pretvodno izradimo projekt zamjene starog zaštitnog užeta novim.

U energetskom kontekstu rekonstrukcija dalekovoda 110 kV Kličev-Breznica u Crnoj Gori je bila neophodna zbog puštanja u rad vjetroparka Krnovo, velikog crnogorskog projekta iz oblasti zelene energije.

Uspješno okončanje naših radnih zadataka u okviru projekta rekonstrukcije dalekovoda 110 kV Kličev-Breznica predstavlja nastavak odlične saradnje sa Crnogorskim elektroprenosnim sistemom (CGES).

Realizacija našeg zadatka u perspektivi doprinosi uspostavljanju stabilnijeg i pouzdanijeg sistema prenosa električne energije, informacija i upravljačkih signala unutar elektroenergetskog sistema Crne Gore, i dodatno osigurava pouzdanje i kvalitetnije napajanje potrošačima.

## VJETROPARK "NA TIBETU"

Vjetropark Krnovo je pozicioniran na istoimenoj visoravni (1.500 m), sjeveroistočno od Nikšića, koja je poznata i pod imenom crnogorski Tibet.

Čini ga 26 turbinu i ima instaliranu snagu 72 MW. Vjetropark će proizvoditi oko 200 GWh električne energije, što je dovoljno za snabdijevanja 50 hiljada domaćinstava, i više je od šest odsto ukupne proizvodnje električne energije u Crnoj Gori.

**EN** Once again, Elnos Group teams confirmed that they perform OPGW works in inapproachable regions of Montenegro spotlessly.

This time, we proved our skills in this field in



Vjetropark Krnovo će proizvoditi 200 GWh električne energije  
Wind farm Krnovo will generate 200 GWh of power

the frame of last year's project of reconstructing 110 kV Kličev-Breznica transmission line.

Our task was to set OPGW with appertaining equipment, but to design a project of replacing old protective rope before that in this 25 kilometers long section of this transmission line.

In energetic sense, reconstructing 110 kV Kličev-Breznica transmission line in Montenegro was necessary due to commission of Wind Farm Krnovo, a big Montenegrin project in the field of green energy.

Successful completion of our tasks in the frame of reconstructing 110 kV Kličev-Breznica transmission line represents continuance of excellent cooperation with Crnogorski elektroprenosni sistem (CGES – Montenegrin Electrical Power Distribution System).

Realization of our task in perspective brings

establishment of more stable and more reliable transfer of electrical power, information and controlling signals within electrical power system of Montenegro, and it additionally provides more reliable and better quality of power supply for consumers as well.

## WIND FARM "ON TIBET"

Wind Farm Krnovo is located on the plateau of the same name (1.500 m), North East from Nikšić, which is also better-known under the name Montenegrin Tibet.

It consists of 26 turbines and has installed power of 72 MW. Wind farm shall produce about 200 GWh of electrical power, which is enough to supply 50 thousand households and makes up more than six per cent of total production of electrical power in Montenegro.

# Biti profesionalac na kopnu i iznad vode

To be professional on land and above water

**U okviru projekta rekonstrukcije  
110 kV dalekovoda Šamac-Odžak  
i Odžak-Modriča ekipe Elnosa  
pokazale hrabrost i spretnost**

*In the frame of project for  
reconstruction of 110 kV transmission  
lines Šamac-Odžak and Odžak-Modriča,  
Elnos teams showed courage and  
agility*



**SR** Elnos Grupa je i prošle godine nastavila da u kontinuitetu realizuje projekte rekonstrukcije dalekovodne mreže za svog dugogodišnjeg partnera, kompaniju Elektroprenos BiH.

Među poslovima koje nam je Elektroprenos BiH povjerio, bio je i dio projekta rekonstrukcije dalekovoda 110 kV Šamac-Odžak i DV 110 kV Odžak-Modriča.

Ovaj projekat je podrazumijevao elektromontažne radove na zamjeni postojećih provodnika novim, sanaciju dijela postojećih oštećenih provodnika, zamjenu kompletne ovjesne i spojne opreme i zamjenu svih postojećih izolatora novim polimernim.

Naši hrabri monteri su u okviru rekonstrukcije ovih dalekovoda u više navrata potvrdili svoju spretnost, hrabrost i efikasan pristup radu.

Prva potvrda njihove umještosti se istakla u prvi plan za vrijeme faze rada iznad rijeke Bosne. Pred njima je bio zadatak da na tom dijelu dalekovoda obave popravku faznog provodnika. Na oko 20 metara visine iznad širokog korita rijeke Bosne, monteri u specijalizovanim kolicima, kližući lagano po provodniku, uspješno su ugradivali spojnice i popravljali uže na licu mjesta.

Druga potvrda praktičnosti naših ekipa se pokazala na dijelu projekta gdje se dalekovod ukršta sa magistralnim putem i željezničkom prugom. Naime, zamjena faznog provodnika na tom dijelu trase je morala biti obavljena u što kraćem roku, zbog kratkog perioda isključenja željezničke kontaktne mreže, kao i obustave saobraćaja na magistralnom putu. I ovaj dio posla su naši monteri obavili uz striktno poštovanje perioda isključenja.

Zahvaljujući efikasnosti u obavljanju zadataka iz ovog projekta, Elnos Grupa je bila karika obezbjedenja stabilnosti elektroenergetskog sistema Posavine.

**EN** Again last year, Elnos Group continued to perform projects of reconstructing transmission lines for its long-term partner - company Elektoprenos BiH.

We were a part of project for reconstructing transmission line 110 kV Šamac-Odžak and TL 110 kV Odžak-Modriča among the projects we were entrusted by Elektoprenos BiH.

This project included performance of electrical assembling works on replacing the existing conductors with new ones, rehabilitation of a part of the existing and damaged conductors, replacement of

entire suspension and connecting equipment as well as replacement of all existing isolators with new polymer isolators.

In the frame of reconstructing these transmission lines, our brave fitters confirmed their agility, courage and efficient working approach many times.

First confirmation of their skillfulness was during the phase of performing works over the River Bosna. They were tasked with repairing phase conductor on this part of the transmission line. At about 20 meters height above wide Bosna riverbed, fitters in specials cars, sliding slowly along conductor, were successfully installing connectors and repaired rope instantly.

Another confirmation of our teams' practicality showed in the part of the project where conductor crosses motorway and railway. Namely, replacement of phase conductor on this part of route had to be performed in a very short period due to short period of disconnecting railway contacting network, as well as stoppage of traffic on motorway. Our fitters performed this part of works with strict respect to timeframe of cut offs.

Thanks to efficient performance of the project, Elnos Group was a link providing stability of electrical power system of Posavina.

# Projekat koji je pobijedio surovosti Dimitora

## Project that beat rigorous Dimitor

**SR** Planina Dimitor, smještena oko 13 kilometara zapadno od Mrkonjić Grada i istočno od gornjeg toka rijeke Sane, je bila domaća geografska kota na kojoj su timovi Elnos Grupe potvrdili snagu i praktičnost u borbi sa surovostima prirode.

Pred naše operativce postavljen je zadatak izgradnje 35 kV dalekovoda od mini-hidroelektrane „Medna“ do postojećeg 35/20 kV dalekovoda Mrkonjić Grad–Previja. Konačni cilj izvođenja ovog poduhvata je bio povezivanje mini-hidroelektrane „Medna“ sa elektroenergetskim sistemom RS.

Ovaj dalekovod je svojim najvećim dijelom izgrađen preko nepristupačnih predjela Dimitora, na kotama od oko 1.200 metara nadmorske visine u prosjeku.

Teren preko kojeg je trebalo postaviti novu trasu dalekovoda je za vrijeme početka radova u decembru bio izuzetno težak. Bilo je veoma hladno, padao je snijeg i ekipama na terenu nije bilo nimalo lako.

Posao se morao raditi uz pomoć velikih bagera i šumskih traktora. Dimitor je planina sa veoma malim brojem prilaznih puteva, tako da je bilo neophodno napraviti nove puteve kako bi se dalekovod mogao izgraditi.

Vladajući uslovi su bili takvi da su tek nakon izrade puteva, samo uz podršku teške mehanizacije mogli uslijediti svi projektom zacrtani geodetski, građevinski i elektromontažni radovi.

Uprkos teškim okolnostima, tim Elnos Grupe, koji je brojao više od 40 radnika i inženjera, izgradio je 17,3 kilometra dugu trasu dalekovoda sa čelično-rešetkastim stubovima prosječne visine do 16 metara.

Izgradnja ovog dalekovoda je, između ostalog, značajna zbog činjenice da je dio energetskog sistema Republike Srpske u oblasti obnovljivih izvora energije.

### SVE FAZE PROJEKTA

Elnos Grupa je u okviru projekta izgradnje dalekovoda Medna–Čađavica učestvovala u svim fazama njegove izgradnje, od rješavanja imovinsko-pravnih odnosa, pribavljanja velikog broja saglasnosti, izrade projektne dokumentacije, prosijecanja osovine trase, geodetskih radova, te izvođenja građevinskih i elektromontažnih radova, pa sve do faze tehničkog prijema i primopredaje radova investitoru.



**Uspješno okončan zadatak na 1.200 metara nadmorske visine**  
Activities on 1,200 meters above sea level successfully finished

Investitor projekta izgradnje mini-hidroelektrane „Medna“ je kompanija EHE Banjaluka.

**EN** Mountain Dimitor, located at about 13 kilometers away from Mrkonjić Grad on the West and East from upper stream of the River Sana, was domestic geographic location where teams from Elnos Group confirmed strength and practicality in fight with rigorous nature.

Our employees were faced with a task to construct 35 kV of transmission line from Mini-Hydro Power Plant "Medna" to existing 35/20 kV transmission line Mrkonjić Grad–Previja. Final goal of performing this project was to connect Mini-Hydro Power Plant "Medna" with electrical power system of the RS.

This transmission line mostly was built over unapproachable areas of Dimitor, on the locations of about 1,200 meters altitude average.

Field of the new route over this transmission line should have been installed had been extremely difficult when the works started in December. It was very cold and snowing and field teams were not at ease at all.

Works had to be done with help provided by big excavators and forest tractors.

Dimitor is a mountain with a small number of approaching roads so there was a need to construct

new roads in order to construct the transmission lines.

Prevailing circumstances were of the kind that only after road were made, and only with support from heavy machinery, all planned geodetic, construction and electrical assembly works could follow.

In spite of difficult conditions, Elnos Group team counting more than 40 employees and engineers built 17.3 kilometer long route of transmission line with steel-lattice poles 16 meters high average.

Construction of this transmission line, among other things, is important for the fact that it makes a part of electrical power system of the Republic of Srpska in the field of renewable energy sources.

### ALL PROJECT PHASES

In the frame of constructing project of transmission line Medna–Čađavica, Elnos Group participated in all phases of its construction, from dealing with property-legal relations, acquiring a big number of consents, making design documentation, cutting route axis, geodetic works, as well as performance of construction and electrical assembly works, all to the phase of technical acceptance and handing over the works to the Investor.

Project investor for construction of Mini Hydro Power Plant "Medna" is company EHE Banja Luka.



Trg Slavija – jedno od najvećih saobraćajnih čvorišta srpske metropole  
Slavija Square – one of largest traffic crossroads of Serbian capital

# Trg Slavija **NOVI (STARI) ORIJENTIR BEOGRADA**

Slavija square New (old) Belgrade landmark



***Elnos Grupa je i otvorila i zatvorila projekat koji je realizovan pet dana prije planiranog, izuzetno kratkog roka***

*Elnos Group both opened and closed the project, which was performed five days before planned, extremely short deadline*

**SR** Sasvim je sigurno da kada jedna od najvećih saobraćajnih žila kucavica metropole uđe u projekat rekonstrukcije, to postane poduhvat od regionalnog značaja. Upravo to se desilo od trenutka objave da Grad Beograd započinje posao rekonstrukcije Trga Slavija, jednog od najvećih saobraćajnih čvorišta srpske metropole. U izuzetno kratkom roku je bilo potrebno rekonstruisati infrastrukturu za novu organizaciju saobraćaja na skveru kojim dnevno prođe 70.000 pješaka i dvostruko više vozila.

„Kompletan projekt je otpočeo našim rado-vima, odnosno demontažom kontaktne mreže u ulici Mije Kovačevića i okretnici na Bogosloviji, u potpunosti se završio sa funkcionalnim probama tramvaja i trolejbusa na Trgu Slavija. Praktično, Elnos Grupa je i otvorila i zatvorila projekt“, zaključio je Veljko Savić, projekt menadžer Elnos Grupe.

Na projektu rekonstrukcije velikih saobraćajnica Beograda, Elnos Grupa je uradila rekonstrukciju tramvajske i trolebuske kontaktne

mreže na Trgu Slavija, ali i na beogradskom Bulevaru oslobođenja, te ulicama Mije Kovačevića i Ruzveltovoj, koje su takođe dio ovog poduhvata. Cjelokupni projekat izведен je u četiri faze.

Najzahtjevnija faza je svakako bila rekonstrukcija Trga Slavija, jer na njemu saobraćaju i tramvaj i trolejbus, tako da se obje vrste vozila na električni pogon mogu okrenuti ukrug. To znači da se trolejbus i tramvaj ukrštaju u više tačaka, što dodatno komplikuje kontaktne mreže. "Ugradili smo ukupno sedam ukrštaja trolejbus-tramvaj, kao i dvije električne i dvije mehaničke skretnice u trolejbuskoj mreži. Kada na sve ovo dodamo i gradevinske radove, ugradnje šest novih, nestandardnih stubova kontaktne mreže oko fontane na centralnom dijelu trga i dvadeset osam stubova kontaktne mreže, kao i mnogo izvođača na malom prostoru, kratak rok za izvođenje radova i konstantne koridore saobraćaja koji su sve vrijeme izvođenja radova bili formirani, onda postaje jasno zašto je rekonstrukcija Trga Slavija bila najkomplikovanija", zaključuje Savić.

Dodatni 'teret' za naše ekipe je bio i što se uporedio sa rekonstrukcijom Trga Slavija vršila i rekonstrukcija desne strane Bulevara oslobođenja i dvije dionice u Ruzveltovoj ulici. Tu nije kraj našim izazovima. Savić dodaje da je najteže bilo kada su istovremeno bili angažovani u tri faze ovog projekta, a radove je otežavao i saobraćaj koji se konstantno odvijao na Trgu Slavija i u Bulevaru oslobođenja. „U gradskim sredinama su kod rekonstrukcija ovog tipa posebno zahtjevni građevinski radovi na izradbi novih temelja, zbog brojne infrastrukture. Na terenu smo naišli na: betonske cijevi za polaganje kablova, elektro vodove, optičke vodove, vodovodnu kanalizaciju, kućne priključke itd.", zaključuje Savić.

## RAD DANJU I NOĆU

Pred nama je bio veoma kompleksan projekat sa zahtjevnim rokom. Ono čime se ponosimo je dobra organizacija projekta i racionalno korištenje ljudskih i materijalnih resursa. Veći dio projekta je realizovan tako da se radilo u dvije smjene u dnevnom režimu rada. Najveći zabilježeni broj radnika u jednoj smjeni sa podizvodnjima je 20. „S obzirom na to da radovi na kontaktnim mrežama spadaju u visokorizične, posebna pažnja se pridavala mjerama bezbjednosti pri izvođenju radova. Ovdje je situacija bila otežana, jer se radilo pod naponom, uz odvijanje saobraćaja", istakao je Savić.

Trg Slavija je veoma značajan za svakodnevni život Beograđana. Kapitalne rekonstrukcije ovakvog trga, na ovakovom položaju se rade jednom u 50 godina. Zbog toga je nova oprema koju smo ugradili posljednja riječ tehnike. Rješenja koja se koriste u drugim velikim gradovima su primi-

jenjena prvi put u Srbiji. Na primjer, ugrađeni su ukrštaji tramvaj-trolejbus kod kojih nema prekida u kontinuitetu napajanja, odnosno vozila su uvijek pod električnim napajanjem.

Gradski menadžer Goran Vesić ocijenio je da je posao urađen dobro i po najvišim standardima. „Trudili smo se da ovaj posao uradimo u najkrćem mogućem roku. Rekonstrukcija je urađena temeljno i ozbiljno, promijenjene su sve instalacije, dodate nove trake. Osim toga, u Ruzveltovoj ulici i Bulevaru oslobođenja napravljene su biciklističke staze. Slavija je urađena tako da je prohodnija za saobraćaj i pješački prelazi više se ne nalaze na samoj Slaviji, a izmještene su i autobuske stanice", naveo je Vesić.

Sa zadovoljstvom konstatujemo da smo značajno doprinijeli ostvarenju cilja ovog projekta. Uspjeli smo to, čak pet dana prije zadatog roka. Beograd je dobio bolju tramvajsку protočnost, uređene saobraćajne trake i kanalizane tokove, sa akcentom na većoj bezbjednosti i boljoj koordinaciji u saobraćaju na čitavom potezu. Nova saobraćajna infrastruktura omogućuje da sada ovim skverom dnevno prođe 140.000 pješaka i dvostruko više vozila.

## SLAVIJA

Trg Slavija je jedna od najprometnijih beogradskih lokacija, na kojoj zajedno sa automobilima saobraćaju sve tri vrste gradskog prevoza: tramvaji, trolejbusi i autobusi.

Nalazi se 1,5 kilometar južno od Terazija. Ovo mjesto je do početka 20. vijeka bilo poznato beogradsko lovište, što je i ostalo sve do vremena kada škotski preduzetnik Frensis Mekensi odlučuje da na ovoj lokaciji izgradi kuću. Nakon toga počinje istorija novog doba ovog mjesta.

**EN** It is pretty clear that once one of the biggest traffic lifelines of a metropolis starts reconstruction, it becomes regionally important endeavor. This is what happened from the moment the City of Belgrade had announced reconstruction works of the Slavija Square, one of the biggest traffic crossroads of Serbian metropolis. In a very short deadline, there was a need to reconstruct infrastructure for new traffic organization at the Square, which is used by 70,000 pedestrians and twice as more vehicles on daily basis.

"Entire project started by our works, i.e. dismounting contact network in Mije Kovačevića Street and turntable on Bogoslovija, and was entirely completed with functional tests of trams and trolleybuses on Slavija Square. Practically, Elnos Group both opened and closed the project", concluded Veljko Savić, Elnos Group Project Manager.

Within the project of reconstructing of big roads of Belgrade, Elnos Group reconstructed tram and trolleybus contact networks on Slavija Square, but also on Belgrade Boulevard Oslobođenja, as well as streets Mije Kovačevića and Ruzveltova, which also have been a part of this project. Entire project was performed in four phases.

"The most demanding phase certainly was reconstruction of Slavija Square since trams and trolleybuses go through it, so that both types of vehicles are electronically driven and can go around. This means that trolleybus and tram intersect in many points, which additionally complicates contact network. We installed seven intersections trolleybus-tram in total, as well as two electrical and one mechanical switch in trolleybus network. When this is complemented by construction works, setting up six new, non-standard

## MODERNIZACIJA INFRASTRUKTURE ŽELJEZNICA RS

ELNOS GRUPA JE U MAJU 2017. ZAVRŠILA SVOJ DIO POSLA U VELIKOM PROJEKTU REKONSTRUKCIJE I MODERNIZACIJE SISTEMA SIGNALIZACIJE I TELEKOMUNIKACIJA ŽELJEZNICA REPUBLIKE SRPSKE. RIJEČ JE O ČETIRI FAZE PROJEKTA: NAPAJANJE SS I TK SISTEMA SA DISTRIBUTIVNE MREŽE, NAPAJANJE SS I TS SISTEMA SA KONTAKTNE MREŽE, GRIJANJE SKRETNICA I NN RAZVOD. U SKLOPU OVOG PROJEKTA URADILI SMO REKONSTRUKCIJU I MODERNIZACIJU ŠEST ŽELJEZNIČKIH STANICA: OSTRUŽNJA, ŠNJEGOTINA, JOŠAVKA, ČELINAC, VRBANJA I BANJALUKA.



towers of contact network around fountain on the central part of the Square and twenty-eight towers of contact network, as well as numerous contractors on a small space, short deadline for works performance and constant traffic corridors, which had been formed during entire works performance, then it becomes clear why reconstruction of the Slavija Square was the most complicated", concludes Savić.

Additional 'burden' for our teams was that reconstruction of the right side of Boulevard Oslobođenja and two sections in Ruzveltova street were performed simultaneously with reconstruction of Slavija Square. Again, this was not the end of our challenges. Savić adds that it was most difficult when they had been engaged in three phases of this project at the same time, and works had also been aggravated by constant traffic going on at the Slavija Square and Boulevard Oslobođenja. "In urban areas, for this type of reconstruction, construction works for constructing new foundations are extremely demanding due to numerous infrastructures. We faced the following on the field: concrete pipes for laying cables, electrical conductors, optical ducts, water sewerage, household connections etc.", concludes Savić.

## WORKING AT DAY AND NIGHT

We had a very complex project with demanding deadline before us. One thing we are proud of is good organization of the project and rational usage of human and material resources. Most of the project was performed in two shifts in day regime. The biggest recorded number of workers in one shift with subcontractors was 20. "Considering the fact those were works on con-

tact networks, which fall in highly risky group, special attention was paid to safety measures at works performance. Here, situation was difficult, since we worked under charge, with traffic going on", said Savić.

Slavija Square is very important for everyday life of Belgrade inhabitants. Capital reconstructions of this Square, at this location are performed once in 50 years. Due to this fact, equipment we installed represents state of the art in technical sense. Solutions used in other big cities were applied in Serbia for the first time. For example, intersections tram-trolleybus were installed and these do not have interruptions in continuous power supply, i.e. vehicles are always under electrical power charge.

Goran Vesić, the City Manager, estimated that works were performed well and in highest standards. "We tried to perform this project in as short deadline as possible. Reconstruction was through and serious, all installations were replaced, new lanes added. Apart from this, bicycle lanes were constructed in Ruzveltovoj street and Boulevard Oslobođenja. Slavija was constructed in the way it is more passable for traffic and pedestrian crossings are no longer in Slavija itself, and bus stops were moved as well", said Vesić.

We are pleased to say that we significantly contributed to accomplishment of this project goal. We made it, even five days before deadline expiration. Belgrade got a better tram flow, organized traffic lanes and canalized throughput, with stress of highest level of safety and better coordination in traffic for entire route. New traffic infrastructure provides us with possibility to have 140,000 pedestrians and twice as more vehicles on this square on daily basis.

## SLAVIJA

Slavija Square is one of the busiest Belgrade locations, where, along with vehicles, there are three other transport means: trams, trolleybuses and buses.

It is situated 1.5 kilometer south from Terazije. This place used to be known as Belgrade hunting ground up until 20th century. It stayed this way up until the moment when Scottish businessman Francis Mackenzie decides to build a house at this location. Afterwards, new age history of this location started.

## MODERNIZATION OF RAILWAYS RS INFRASTRUCTURE

IN MAY 2017, ELNOS GROUP COMPLETED ITS PART OF WORKS IN BIG PROJECT OF RECONSTRUCTING AND MODERNIZATION OF SYSTEM FOR SIGNALIZATION AND TELECOMMUNICATION OF THE RAILWAYS OF THE REPUBLIC OF SRPSKA. THESE ARE FOUR PROJECT PHASES: POWER SUPPLY FOR SS AND TC SYSTEM FROM DISTRIBUTIVE NETWORK, POWER SUPPLY OF SS AND SUBSTATION SYSTEM FORM CONTACT NETWORK, HEATING OF SWITCHERS AND LV DISTRIBUTION. WITHIN THIS PROJECT, WE RECONSTRUCTED AND MODERNIZED SIX RAILWAY STATIONS: OSTRUŽNA, ŠNJEVOTINA, JOŠAVKA, ČELINAC, VRBANJA AND BANJA LUKA.

Rekonstrukcija trga - najzahtjevna faza poduhvata  
Square reconstruction - most demanding project phase



## Brojke

Figures

**197**

stubova kontaktnе  
mreže i temelji za njih  
towers of contact network  
and foundations for those

**8**

vozog voda  
driving ducts

**180**

konzola  
consoles

**7**

ukrštaja  
tramvaj-trolejbus  
intersections  
tram-trolleybus

**4**

električne i  
mehaničke skretnice  
za trolejbus  
electrical and mechanical  
trolleybus switches

**15**

električnih i mehaničkih  
skretnice za tramvaj  
electrical and  
mechanical tram  
switches

**1,5**

napojnog kabla  
PP44 1x500 mm<sup>2</sup>  
of power cable PP44  
1x500 mm<sup>2</sup>

**2**

napojnog voda Al/Če  
uže 240/40 mm<sup>2</sup>  
of power duct Al/Fe  
rope 240/40 mm<sup>2</sup>

# Auto-put Banjaluka–Doboj: **SAOBRĂAJNICA NOVOG DOBA**

Highway Banja Luka–Doboj: Road of new age



Dionica auto-puta Banjaluka-Doboj Section of Banja Luka-Doboj highway



**Elnos Grupa je uspjela odgovoriti svim izazovima jednog od najvećih infrastrukturnih projekata u Republici Srpskoj, izgradnji auto-puta Banjaluka–Doboj. Nakon pet godina intenzivnih radova na terenu, izgradnja ove saobraćajnice 2018. godine ulazi u finalnu fazu. Ponosni smo što učestvujemo u izgradnji saobraćajnice koja posjeduje najveći potencijal za dalju integraciju unutar Republike Srpske, povezivanje Beograda, Banjaluke i Sarajeva, kao i povezivanje auto-puta Gradiška–Banjaluka sa panevropskim koridorom 5C**

*Elnos Group manages in responding to all challenges in one of the biggest infrastructural projects in the Republic of Srpska, i.e. construction of Highway Banja Luka–Doboj. After five year of intensive field works, construction of this road gets to the final phase in 2018 year.*

*We are proud to participate in construction of the road having the biggest capacity for further integration within the Republic of Srpska, connecting Belgrade, Banja Luka and Sarajevo, as well as connecting to Highway Gradiška–Banja Luka with Pan-European Corridor 5C*

## **SR DIONICA BANJALUKA–PRNJAVOR**

Radovi Elnos Grupe na izgradnji auto-puta Banjaluka–Doboj su prošle godine, nakon završetka poslova na dionici Prnjavor–Doboj, preseljeni na dionicu Banjaluka–Prnjavor.

Na ovoj dionici radovi Elnos Grupe obuhvataju izradu projektne dokumentacije, izmještanje SN i NN mreže i demontažu dalekovoda 110 kV Lakaši–Topola i 400 kV Tuzla–Banjaluka.

Naši operativci su, između ostalog, zaduženi za izvođenje radova na dalekovodnoj mreži oko tunela Potočari. U okviru ovog posla su obavili građevinsku fazu projekta, dok će dio radova koji se odnosi na postavljanje rasvjete i SN i NN napajanje u ovom tunelu biti obavljen početkom građevinske sezone 2018. godine.

Elnos Grupa je sa ciljem stvaranja uslova maksimalne bezbjednosti saobraćaja u regularnim i vanrednim uslovima na dionici auto-puta Banjaluka–Prnjavor, obezbijedila stabilno napajanje javne rasvjete, putne signalizacije, IKT portala i SOS telefona.

U okviru ovog dijela projekta ekipe Elnos Grupe su montirale stabilnu mrežu napajanja putne signalizacije duž auto-puta, postavljanjem osam 20/0,4 kV trafostanica, koje obezbeđuju maksimalno stabilan sistem napajanja IKT portala, SOS telefona i javne rasvjete.

Ovaj posao je, između ostalog, značio da je u dužini od šest kilometara postavljena javna rasvjeta na potezu od petlje Mahovljani 1 do petlje Mahovljani 2, zatim od Mahovljana 2 do odmorišta Vrbas, te na području oko Prnjavora i Drugovića.

Na dionici Banjaluka–Prnjavor do sada su okončani radovi na deset kilometara dugoj trasi na potezu od Mahovljani do Drugovića. Završetak radova na preostala 25,3 kilometra ove etape auto-puta se prema ranije usvojenoj dinamici očekuje u jesen 2018.

#### DIONICA PRNJAVOR–DOBBOJ

Radovi Elnos Grupe na dionici auto-puta Prnjavor–Doboj, čija dužina iznosi 36,6 kilometara, okončani su u jesen prošle godine. Ovo je bio sveobuhvatan posao koji je podrazumijevao: elektroinstalaterske radove, postavljanje TK kablovske signalizacije, SOS telefona, IPT portala, ugradnju SN i NN kablovskih vodova, izgradnju dvije MBTS trafostanice snage 630 kVA i instaliranje 297 rasvjetnih stubova. Radovi na dionici Prnjavor–Doboj su trajali od aprila 2013. godine, pa sve do njenog puštanja u promet u jesen 2016.

vor–Doboj su trajali od aprila 2013. godine, pa sve do njenog puštanja u promet u jesen 2016.

#### EN SECTION BANJA LUKA–PRNJAVOR

Last year, after completion of Section Prnjavor–Doboj, works performed by Elnos Group on the construction of Highway Banja Luka–Doboj have been moved to Section Banja Luka–Prnjavor.

In this section, works performed by Elnos Group include construction of design documentation, relocation of MV and LV network and disassembling transmission lines 110 kV Laktaši–Topola and 400 kV Tuzla–Banja Luka.

Among other tasks, our specialists are in charge of performing works of transmission line network around tunnel Potočari. In the frame of this project, construction part has been realized whereas a part of works referring to lights installation and installation of MV and LV power supply in this tunnel shall be performed at the beginning of construction season in the 2018 year.

In the aim of creating conditions for maximum traffic safety in ordinary and extraordinary circumstances at the section of Highway Banja Luka–Prnjavor, Elnos Group provided reliable power supply for public lighting, road signs, ICT portal and SOS telephones.

Within this part of project, Elnos Group teams

mounted reliable network for power supply of road signs along highway by installing eight 20/0.4 kV substations, which provide maximum reliable system of power supply for ICT Portal, SOS telephones and public lighting.

Among other things, these work included installation of public lighting from Loop Mahovljani 1 to Loop Mahovljani 2, then from Mahovljani 2 to Rest Vrbas, as well in the area around Prnjavor and Drugovići six kilometers long.

Works often-kilometer long route from Mahovljani to Drugovići at Section Banja Luka–Prnjavor have been completed up to now. According to previously adopted time schedule, completion of works of the remaining 25.3 kilometers of this stage of highway is expected in autumn 2018.

#### SECTION PRNJAVOR–DOBBOJ

Works of Elnos Group at the highway Section Prnjavor–Doboj, which is 36.6 kilometers long, completed in autumn in the 2016 year. This was comprehensive work included as follows: works on electrical installations, laying TC cable signs, SOS telephones, IPT Portal, installation of MV and LV cable lines, construction of two CCTS power 630 kVA and installation of 297 lighting poles. Works of Section Prnjavor–Doboj lasted from April 2013 up to its commission in autumn 2016.



Obezbjedili smo stabilno napajanje javne rasvjete na auto-putu  
Stable power supply for public lighting on the highway is provided

# Nova rješenja za sušenje kopa RiTE Gacko

New solutions for drying cast mine M&TPP Gacko



Obezbjedili smo sistem za sigurnost kopa u RiTE Gacko  
Mining pit safety system provided in M&TPP Gacko

**SR** Rudnik i termoelektrane Gacko (RiTE Gacko) je najveći energetski gigant Hercegovine, koji godinama važi za jednu od najznačajnijih karika lanca stabilnosti proizvodnje električne energije Elektroprivrede RS.

Termoelektrana Gacko posjeduje snagu od 300 MW, a kao gorivo koristi lignit površinskog kopa Gračanica. Ovu energetsku bazu je neophodno čuvati od nadiranja padavinskih i podzemnih voda. Upravo zbog ovog problema, koji naglašeno opterećuje rad kopa proteklih godina, RiTE Gacko je bila neophodna projektna i sistemska podrška.

Elnos Grupa je, prema zahtjevima RiTE Gacko, projektovala, izradila i isporučila tri posebna mobilna kontejnerska postrojenja.

Ova postrojenja obezbeđuju napajanje električnom energijom tri pumpe za vodosabirnik u kome se skuplja sav višak padavina i podzemnih voda na kopu C u RiTE Gacko.

U mobilna kontejnerska postrojenja smo ugradili SN postrojenja, transformatore, te ormare sa ugrađenim PLC-ovima. Sva tri postrojenja su zavarena na čelične sanke, te se uz pomoć buldožera mogu pomjerati po kopu rudnika.

Zahvaljujući softverima i PLC-ovima instaliranim u postrojenja koja smo im isporučili, ope-

rater koji upravlja pumpama dobija sve neophodne informacije o količini vode u vodosabirniku.

„O tome koliko snažne padavine znaju biti i koliko zaista vode može biti u vodosabirniku, dovoljno govori činjenica da su iznad njega postavljene pumpe koje imaju mogućnost da ispumpavaju između 150 i 170 litara vode u sekundi. Dotok vode zna biti toliki, da sve tri pumpe moraju da rade paralelno“, rekao je Mitar Vadić, inženjer na ovom projektu.

U okviru ovog projekta Elnos Grupa je isporučila reflektore i opremu za signalizaciju koja je neophodna za obezbeđenje površinskog kopa C Gračanica.

**EN** Mine and Thermo-Power Plant Gacko, electrical power giant of Elektroprivreda RS, is situated in North-East part of Herzegovina. Coal exploitation has been important link in the chain of stability of producing electrical power for Elektroprivreda RS system for this region for decades.

Thermo-Power Plant Gacko has capacity of 300 MW, and brown coal of the cast mine Gračanica is used as fuel. This energetic base is to be preserved from strong atmospheric falls and underground waters. Due to this problem, which significantly has aggravated work of the cast mine in previous years,

Projektovali smo tri posebna mobilna kontejnerska postrojenja koja obezbeđuju napajanje električnom energijom za pumpe na kopu C u RiTE Gacko

We designed three separate mobile container plants to provide power supply for pumps of cast mine C in M&TPP Gacko

M&TPP Gacko needed design and system support.

Elnos Group, according to requirements by M&TPP Gacko, designed, made and delivered three special mobile container plants.

These plants provide electrical power supply for three pumps of water collector that collects all extra atmospheric falls and underground waters of the cast mine C in Thermo-Power Plant Gacko.

We installed MV plants, transformers as well as cabinets with installed PLCs in mobile container plants. All three plants have been welded on steel sleigh and these can be moved with help of bulldozer around the cast mine.

Thanks to software and PLCs installed in plants we delivered, operator operating the pumps is provided with all the necessary information on water amount in water collector.

“On how falls can be voluminous and how much water can realistically be in the water collector speaks the fact it has pumps installed over it with possibility to pump out between 150 and 170 liters of water per second. Water inflow can be so heavy that all three pumps have to work simultaneously, said Mitar Vadić, engineer of this project. In the frame of this project, Elnos Group delivered head lights and equipment for signalization necessary for securing cast mine C Gračanica.

# Zadatak na deset spratova

Task on ten stories



**Elnos Grupa okončala  
sveobuhvatne  
elektroinstalaterske radeve na  
poslovnoj zgradi "Agrama"  
u Banjaluci**

*Elnos Group completed  
comprehensive electrical  
installation works of  
business building of "Agram"  
in Banja Luka*



**Poslovni centar "Agram" u Banjaluci**  
Business center "Agram" in Banja Luka

**SR** Elnos Grupa je uspješno okončala obimne elektroinstalaterske radeve na još jednoj poslovnoj zgradi. U pitanju je bio angažman na izgradnji novog, modernog poslovnog centra "Agram", desetospratnici koja se prostire na 20.900 kvaratnih metara.

Bio je ovo poduhvat u čijim je okvirima Elnos morao da pokaže veliki smisao za praktičnost, usvajanje novina i požrtvovanje.

Radeći prekovremeno, u veoma dinamičnim uslovima, sa ciljem da maksimalno kvalitetno ispuni zahtjeve i rokove investitora, kompanije "Agram" Banjaluka, tim Elnosa je i ovaj put usprio da potvrdi visok stepen profesionalizma u pristupu radu.

„Svi radnici su maksimalno profesionalno pristupili poslovima. Radili su požrtvovano i angažovano, nekad subotama i nedjeljama, kako bi ovaj posao bio završen u roku. Bili su odličan tim i veoma sam zadovoljan načinom na koji smo obavili sve zadatke“, rekao je Dra-

gan Stupar, inženjer na ovom projektu.

U okviru ovog projekta smo izvršili polaganja svih napojnih kablova, uspontskih vodova jake i slabe struje, izradu razvodnih ormara jake struje za sve spratove, montažu i puštanje dva agregata od 250 kVA u rad.

Pored toga, montirana su i puštena u rad dva neprekidna izvora napajanja (UPS-a) od 100 kVA i 60 kVA, takođe je izvršena montaža i puštanje u rad grijaća oluka, grijaća za vodo-vodne cijevi, grijaća cijevi čilera.

**EN** Elnos Group successfully completed a huge electrical installation work at one more business building. This was construction of a new, modern business center "Agram", ten-story building of 20,900 square meters.

This was a project where Elnos had to express significant sense of practicality, adopting novelties and sacrificing.

Working overtime, in very dynamic conditions, in the aim to meet requirements and dead-

lines of the investor, company "Agram" Banja Luka, in maximum of quality, Elnos team again made it to confirm a high level of professionalism in work approach.

"All employees approached the works in maximum of professionalism. They worked devotedly and were committed, sometimes on Saturdays and Sundays, in order to complete this project timely. They were excellent team and I am very satisfied by the way we performed all our tasks", said Dragan Stupar, engineer of this project.

In the frame of this project we laid all supply cables, riser pipes of high and low current, production of distribution cabinets for high current for all stories, mounting and commissioning 250 kVA generators.

Apart from this, we mounted and commissioned two uninterrupted power supply (UPS) sources of 100 kVA and 60 kVA. Likewise, we mounted and commissioned gutters heaters, water system heaters chillers pipes heaters.

# EMR Banjaluka zabilježila

# NAJBOLJU GODINU DO SADA

## EMW Banja Luka records the best year so far



**Ključ uspjeha je u konstantnom usavršavanju proizvodnje i spremnosti za odgovor na novi izazov**

*Key of the success lies in constant improvement of production and readiness to respond to a new challenge*

**SR** Zahvaljujući velikom broju angažmana na infrastrukturnim i industrijskim projektima, ali i generalno pojačanom plasmanu prodaje, Elektromontažna radionica Banjaluka je zabilježila najbolju od svih 11 godina postojanja.

U EMR-u Banjaluka vjeruju da je ključ njihovog uspjeha baziran na produkciji sve kompleksnijih proizvoda spremnih da odgovore sve većim tržišnim potrebama.

EMR Banjaluka je za potrebe različitih postrojenja realizovala spektar projekata različitih tipova, a u najvećoj mjeri je proizvodila ormare zaštite i upravljanja, glavne razvodne ormare, te ormare automatičke i NN blokove.

"Elektromontažna radionica Banjaluka je ove godine zabilježila veoma dobre poslovne rezultate. Drago nam je što smo u proteklom periodu predstavljali važan dio realizacije širokog spektra projekata. Upravo ovakav trend nam je najbolji podstrek da i ubuduće spremno odgovorimo na nove tržišne izazove", rekao je Darko Krecelj, rukovodilac proizvodno-logističkog centra u Banjaluci.

Među ključne projekte u kojima je EMR Banjaluka učestvovala u prethodnoj godini spadaju izgradnja poslovnog centra "Agram" Banjaluka, podrška izgradnji novog postrojenja u fabriци "Alumina" Zvornik, te radovi u okviru klinike "Kostić" Banjaluka.

U okviru projekta poslovni centar "Agram" Banjaluka, EMR je proizvela i ugradila više od 70 distributivnih ormara.

EMR Banjaluka je u 2017. godini radila i sveobuhvatan posao za zvorničku fabriku "Alumina".

Za "Aluminu" su izrađivani ormari za napajanje elektromotornih pogona u novom postrojenju.

Ovoj kompaniji smo isporučili niskonaponske razvodne ormare za novo postrojenje za silika gel, koje se gradi u krugu fabrike.

U EMR su izrađeni ormari zaštite i upravljanja za projekte u okviru investicionog ciklusa Elektroprenosa BiH u kojima učestvuje naša kompanija.

Pored proizvodnje ormara, u okviru ovog projekta, naše ekipi su uspješno obavile i poslove montaže, ispitivanja i njihovog puštanja u rad.

Elektromontažne radionice su kroz realizovane projekte tokom prošle godine potvrdile da su istinska sinteza svih sektora kompanije, od prodaje, preko inženjeringu, pa sve do logistike.

**EN** Thanks to big engagement in infrastructural and industrial projects, but also overall increased sales scope, Electrical mechanical workshop Banja Luka recorded the best of all 11 years in its existence.

In EMW Banja Luka, they believe that the key to its success is based on production of more complex products ready to respond to ever increasing market needs.

EMW Banja Luka performed a series of various types of projects and mostly produces cabinets for protection and control, main distribution cabinets, automation cabinets and LV blocks for need of various plants.

"Electrical mechanical workshop Banja Luka recorded very good business results this year. We are glad we made to perform a year like this and we believe we are going to be able to respond readily to new market challenges", stated Darko Krecelj, Head of production-logistic center in Banja Luka.

Construction of business center "Agram" Banja Luka, support for construction of new plant in the factory "Alumina" Zvornik, as well as works in the clinic "Kostić" Banja Luka fall into key projects EMW Banja Luka participated in last year.

In the frame of the project business center "Agram" Banja Luka, EMW produced and installed more than 70 distribution cabinets.

In 2017, EMW Banja Luka also worked on overall project for factory "Alumina" in Zvornik. Cabi-



nets for electrical power engines were made in this plant for "Alumina".

This company was delivered low-voltage distribution cabinets for new silica gel plant being built in the factory yard. With W

In EMW are made cabinets of protection and control for the projects in a frame of investment cycle Elektroprenos BiH where our company is participated.

Apart from production of cabinets, within this project, our teams successfully performed assembling, testing and their commission.

Through projects performed during last year, electrical mechanical workshops confirmed they are true synthesis all company sectors from sales through engineering all the way to logistics.

# Znanjem i vještinama do boljih rezultata

Knowledge and skills for better results

## **SR** MONTERI VRJEDNO UČILI TOKOM AVGUSTA

Kompanija ENS, slovenačka članica Elnos Grupe je u saradnji sa njemačkom korporacijom Südakabel, prošlog ljeta, u Slovenskoj Bistrici organizovala edukaciju za sticanje sertifikovanih znanja za samostalno montiranje kablovskih glava.

Uz stručnu koordinaciju trenera iz Südakabla, dva montera ENS-a su za vrijeme toplog ljetnog perioda uspješno prošla edukaciju i izradila vanskje kablove glave na 110 kV kablovima.

Sticanjem novih znanja monteri su stekli uslove za realizaciju poslova montiranja kablovskih glava, što je značajno za bogatiji portfolio ENS-a.

## INŽENJERI PROŠLI NOVU OBUKU U ŠVEDSKOJ

Naši inženjeri su u maju i junu prošle godine u gradiću Ludvik u srcu Švedske, prošli obuku za montažu i servisiranje visokonaponskih prekidača, tipa LTB D1/B, LTB E1-E4 sa radnim mehanizmom polova: BLK222, BLG1002A, MSD1, FSA1.

Obuka je održana u ABB-ovom novom i odlično opremljenom prostoru za obuke i treninge, za visokonaponske prekidače.

Za vrijeme stručnog usavršavanja inženjerima je prezentovano funkcionisanje prekidača proizvođača ABB za naponske nivoje od 72,5 kV do 800 kV.

Uz asistenciju stručnjaka iz ABB-a, naši inženjeri su tokom dvije radne sedmice imali priliku da se upoznaju sa različitim tipovima mehanizama pogona prekidača.

Obuka je obuhvatala potpunu demontažu i montažu ključnih elemenata pogonskih mehanizama u vidu motora, špulni, opruga, što je efektivan pristup obuci, koji daje praktično znanje za kasnije samostalno vršenje servisa ovih pogonskih mehanizama.

## OBUKA ZA PUNJENJE I MJERENJE SF<sub>6</sub> GASA

U svim zemljama članicama Evropske unije, samo sertifikovanim inženjerima je dozvoljeno

da obavljaju projekte koji uključuju poslove sa SF<sub>6</sub> gasom.

Ovo je bio samo jedan od razloga više da inženjeri Elnos Grupe, u organizaciji kompanije Siemens AG, prođu edukaciju pod nazivom: SF<sub>6</sub> sertifikacija.

Za dva dana, koliko je trajala obuka, oni su imali priliku da prođu kroz njen praktični i teoretski dio, nakon čega su uspješno stekli sertifikat za ovlašteno punjenje i mjerjenje SF<sub>6</sub> gase.

Edukacija koja je održana u trening centru Siemens-a u Berlinu je ujedno bila i prilika za upoznavanje sa radom Siemens giganta.

## **EN** FITTERS STUDIED HARD DURING AUGUST

Last summer in Slovenska Bistrica, company ENS, a Slovenian member of Elnos Group, cooperating with German cooperation Südakabel, organized education for acquiring certified knowledge for sole mounting of cable terminations.

With professional coordination of teachers from Südakabel, two fitters from ENS successfully completed education and made external cable terminations on 110 kV cables during hot summer period.

By acquiring new knowledge, fitters acquired conditions for realization of works on mounting of cable terminations, which is significant for ENS portfolio.



Monteri ENS-a u Slovenskoj Bistrici  
ENS fitters in Slovenska Bistrica



Naši inženjeri na obuci u Švedskoj  
Our engineers on a training in Sweden

## ENGINEERS PASSED NEW TRAINING IN SWEDEN

Our engineers passed training for mounting and servicing high-power switchers type LTB D1/B, LTB E1-E4 with operating mechanism of poles: BLK222, BLG1002A, MSD1 and FSA1 in small town Ludvik in the heart of Sweden in May and June last year.

Training was held in ABB's new and excellently equipped space for educations and trainings for high-power switchers.

During professional development, engineers were presented with operation of switchers produced by ABB for power levels from 72.5 kV to 800 kV.

Assisted by professionals from ABB, our engineers had a chance to get introduced to various types of switchers operating mechanisms for two working weeks.

Training covered complete dismounting and mounting key elements of operating mechanisms in form of engines, spools, springs, which is an effective approach to education providing practical knowledge for later sole servicing these operating mechanisms.

## TRAINING FOR CHARGING AND MEASURING SF<sub>6</sub> GAS

In all members of the European Union, only certified engineers are allowed to perform projects including works with SF<sub>6</sub> gas.

This was only one of the reasons that engineers from Elnos Group pass education titled - SF<sub>6</sub> certification organized by company Siemens AG.

For two days of education, they had a chance to cover its practical and theoretical part. After this, they successfully acquired certificate for authorized charging and measuring SF<sub>6</sub> gas.

Education held at the Siemens training center in Berlin also was a chance for introducing to work of Siemens giant.

# ELNOS BL NO.1

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PROIZVODA  
U BiH

Elnos BL-No.1  
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in BiH

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**ELEKTROENERGETIKA:**  
nadzemni vodovi,  
transformatori, rasklopna  
postrojenja

**ELECTRIC POWER:**  
overhead lines,  
transformers,  
switching facilities

**SVJETSKI I DOMAĆI  
BRENDOVI:**

Legrand, GE Power, GE Lighting,  
Dietzel Univolt, Lug, V-Tac,  
Benedict, Rittal, Phoenix  
Contact, Haupa, Aling-Conel

**WORLDWIDE AND DOMESTIC  
BRANDS:**

Legrand, GE Power, GE Lighting,  
Dietzel Univolt, Lug, V-Tac,  
Benedict, Rittal, Phoenix  
Contact, Haupa, Aling-Conel



**PRODAJNI CENTRI:**  
Banjaluka, Doboј, Bijeljina,  
Prijedor i Istočno Sarajevo  
**DISTRIBUTIVNA MREŽA**  
u cijeloј BiH

**SALES CENTERS:**  
Banja Luka, Doboј, Bijeljina,  
Prijedor and East Sarajevo  
**DISTRIBUTION NETWORK**  
throughout BiH

# NUDIMO WE OFFER

**INDUSTRJA:**

mjerna tehnika, sklopna i  
relejna tehnika

**INDUSTRY:**

measurement technology,  
switchgear and  
relay technique

**ADMINISTRATIVNI  
OBJEKTI:**

strukturna mreža, UPS-ovi,  
rasvjeta

**ADMINISTRATIVE  
BUILDINGS:**

structure network, UPS,  
lighting

**STANOGRADNJA:**

kablovi, galerijerija, rasvjeta,  
interfoni, alati, ventilacioni  
sistemi

**HOUSING:**

cables, accessories, lighting,  
intercoms, tools, ventilation  
systems

**Napredne  
mogućnosti**  
Advanced  
possibilities

**Pouzdane  
instalacije**  
Reliable  
installations

**Vrhunski  
kvalitet**  
Top  
quality

**Povoljne  
cijene**  
Good  
prices

**Brzu  
isporuku**  
Easy  
delivery

**Tehničku  
podršku**  
Technical  
support



Predstavljanje Elnos Grupe na savjetovanju CIGRE Slovenija  
Presenting Elnos Group on conferences CIGRE in Slovenia

Znanje i biznis:

# Elnos Grupa ponosni učesnik četiri CIGRE savjetovanja

Knowledge and business: Elnos Group proud participant of four CIGRE conferences

**SR** Elnos Grupa je prošle godine bila sponzor i učesnik četiri velika CIGRE savjetovanja za električne mreže, koja su održana u Srbiji, Crnoj Gori, Sloveniji i Makedoniji.

Najpoznatija savjetovanja iz oblasti energetike su se odvijala u kontinuitetu tokom maja i septembra 2017. godine, a u tom periodu predstavljene su stotine naučnih i stručnih radova koji se bave oblastima proizvodnje, prenosa i distribucije električne energije.

Održana savjetovanja su ujedno bila prilika da predstavnike poslovne javnosti upoznamo sa aktuelnim projektima koje mi u Elnos Grupi realizujemo u Švedskoj, Islandu, Srbiji, BiH i Crnoj Gori, te činjenicom da naša grupacija zauzima sve značajniju ulogu na tržištu elektroenergetike u regiji i u Evropi.

CIGRE savjetovanja u zemljama bivše Jugoslavije decenijama unazad okupljaju stručne i naučne radnike, poslovne ljudе iz elektroprivrednih kompanija, elektroindustrije, projektantskih, konsultantskih, naučno-istraživačkih obrazovnih institucija u regiji.

Za vrijeme CIGRE savjetovanja učesnici su imali mogućnost da u diskusijama koje su vodene na sjed-

nicama Studijskih komiteta, daju svoj doprinos rješavanju aktualnih problema u elektroenergetskom sektorima zemalja regije.

Osnovni ciljevi CIGRE savjetovanja stavljaju naročit naglasak na razmjenu tehničkih informacija i iskustava i pružanju nove inicijative za proučavanje problematike od interesa za elektroenergetske sisteme zemalja regije.

## MEĐUNARODNA KONFERENCIJA "UGALJ"

Predstavnici Elnos Grupe su učestvovali u sedmoj Međunarodnoj konferenciji "Ugalj 2017", održanoj na Zlatiboru od 11. do 14. oktobra.

Ovom prilikom, svoj nastup smo iskoristili da bismo predstavili iskorake koje je Elnos Grupa napravila u projektima iz oblasti termoenergije tokom proteklih nekoliko godina.

Glavne teme konferencije "Ugalj 2017" su se odnosile na stanja geoloških i eksploracionih rezervi uglja, mogućnosti unapređenja sistema eksploracije uglja, te razvoju softvera za njegovu eksploraciju.

**EN** Last year, Elnos Group was a sponsor and participant in four big CIGRE conferences for electrical power networks, which were held in Serbia, Montenegro, Slovenia and FYR Macedonia.

The best known consultancy conferences in the field of electrical power were held continuously during May and September 2017 and in this period hundreds of scientific and professional works were presented in the field of production, transfer and distribution of electrical power.

Organized conferences also were a chance to introduce representatives of business public to our current projects that we, Elnos Group perform in Sweden, Iceland, Serbia, BiH and Montenegro, as well as to the fact that our group takes even more important role at the market of electrical power regionally and in Europe.

For decades, CIGRE conferences in countries of former Yugoslavia gather professional and scientific workers, businessmen from electrical power companies, electrical industry, designers, consultant, scientific-research and educational institutions of the region.

During CIGRE conferences, participants had a possibility to contribute solving current problems in electrical power sectors of the countries in the region through discussions on meetings by Study committees.

Basic goals of CIGRE conferences especially stress exchange of technical information and experiences, and provide new initiatives for studying problems interesting for electrical power systems of the regional countries.

#### **INTERNATIONAL CONFERENCE "COAL"**

Representatives of Elnos Group participated in seventh International conference "Coal 2017", held on Zlatibor from October 11 to 14.

On this opportunity, we used our participation to represent steps that Elnos Group made in projects in the field of thermal energy in the few previous years.

Main annual topics of the conference "Coal 2017" referred to situation in geological and exploitation reserves of coal, possibilities of improving system of coal exploitation as well as development of software for its exploitation.

#### **SR NAJBOLJI STRUČNI RAD 10. CIRED SAVJETOVANJA**

Nacionalni komitet CIRED Srbija je u okviru stručne komisije „Kvalitet električne energije i elektromagnetna kompatibilnost”, za najbolji stručni rad 10. CIRED savjetovanja o elektrodistributivnim mrežama Srbije proglašio studiju u čijoj je realizaciji, zajedno sa još pet autora, učestvovao Marko Mijić, zamjenik izvršnog direktora za inženjeringu Elnosa BL.

Izrada nagrađene studije pod nazivom „Problem zaštite 35 kV postrojenja sa izolovanim neutralnom tačkom u planinskom području od prenapona” je na svojevrstan načininicirana nizom havarija koje su se u jednom, kratkom

roku desile za vrijeme eksplotacije u Hidroelektrani Bočac.

U okviru ove studije autori su se analitično bavili detaljnim istraživanjem uzroka havarije, nakon čega su ponudili rješenja za djelovanje u okolnostima ovog tipa.

Sve pohvale za autorsku ekipu koja je „krizna“ dešavanja u HE Bočac iskoristila da stvari rad koji je izazvao veliku pažnju stručne javnosti.

#### **USPJEŠNA PREZENTACIJA NA CIRED SLOVENIJA**

Žiga Hribar, inženjer naše slovenačke članice ENS je u okviru stručnog savjetovanja za električne mreže CIRED Slovenija, predstavio svoj rad pod nazivom "Iskustva nadzora distribucijskih transformatora pomoću brojila električne energije".

U okviru svoje stručne prezentacije, Hribar je predstavio aktuelna saznanja pilotne upotrebe standardnog industrijskog brojila električne energije sa dodatnim strujnim senzorom i integriranim programskim modulom za dijagnostikovanje termičkih stanja distribucionih SN/NN transformatora.

Koristimo priliku da kolegi Hribaru čestitamo na lijepoj prezentaciji u okviru ovog savjetovanja.

Inače, savjetovanje CIRED se već gotovo tradicionalno organizuje u svim državama bivše Jugoslavije, a vjerujemo da će i naredne konferencije ovog i sličnog tipa, kao i do sada, predstavljati svoja najnovija iskustva, projekte i stručne radove.

#### **EN BEST PROFESSIONAL WORK OF 10. CIRED CONFERENCE**

Within professional commission "Quality of electrical power and electromagnetic compatibility", the National Committee CIRED Serbia announced the best study was a study in which Marko Mijić, Deputy Executive Director of Elnos BL Engineering, took part in along with five other authors.

This study was announced the best professional work of 10th CIRED Serbia Conference on electrical distributive networks in Serbia.

Awarded study titled "Problem of protecting 35 kV plant with isolated neutral point from over-voltage in mountain area" was, in a way, initiated by a series of crushes that had happened in a short period during exploitation of the Hydro Power Plant Bočac.

In the frame of this study, authors analytically dealt with detailed research of causes for crushing, after which they offered solutions for work in such circumstances.

We have only major kudos for authors who used "crisis" events in the HPP Bočac to create a study attracting huge attention of professional public.

#### **SUCCESSFUL PRESENTATION AT CIRED SLOVENIA**

Žiga Hribar, an Engineer of our Slovenian member ENS, presented its work titled "Experiences of supervising distribution transformers by meters of electrical power" within last year's professional Conference for electrical networks CIRED Slovenia.

In the frame of its professional presentation, Hribar presented current findings of pilot using standard industrial meter of electrical power with additional power sensor and integrated program module for diagnosing thermic states of distribution MV/LV transformers.

We would like to use this opportunity to congratulate colleague Hribar for beautiful presentation on this Conference.

Likewise, CIRED Conference has almost been traditionally organized in all states of former Yugoslavia, and we believe that upcoming conferences of this or similar kind shall represent its latest experiences, projects and professional works the way it did so far.



Žiga Hribar, inženjer ENS-a Žiga Hribar, ENS Engineer



**SR STALI SMO UZ CRVENO-PLAVE**

Elnos Grupa se pridružila velikoj sportskoj porodici spremnoj da podrži fudbalski klub Borac u pripremama za Premijer ligu BiH, i obezbjeđivanju sredstava za funkcionisanje poznatog kluba iz Platonove.

Potpisujući ugovor o sponsorstvu fudbalskog kluba Borac, Elnos Grupa je potvrdila svoju društveno odgovornu opredijeljenost.

**EN WE STOOD BY RED-BLUES**

Elnos Group joined the big sport family ready to support Football Club Borac in its preparations for Premier league of BiH and providing funds for functioning of this well-known club from Platonova Street.

Singing a contract on sponsorship for the Football Club Borac, Elnos Group confirmed its choice of social responsibility.

**SR DVije DECENIJE MAGIJE TEATAR FESTA**

Svaki pozorišni festival je istinski praznik kulture i nije mala stvar kada jedna institucija kulture dočeka proslavu 20 godina postojanja svog festivala. Upravo ovakav jubilej je slavilo i živjelo Narodno pozorište RS, kroz održavanje predstava u okviru manifestacije „Teatar fest 2017“.

Elnos Grupa je tradicionalno podržala održavanje i ovog festivala, čija magija svake godine hrani duše više hiljada ljubitelja pozorišne umjetnosti.

**EN TWO DECADES OF THEATER FEST MAGIC**

Each theater festival truly is a cultural festivity and it not a small deal when an institution lives to celebrate 20 years of its festival. This kind of jubilee was celebrated by the RS National Theatre through organizing plays within event titled "Theater Fest 2017".

Elnos Group traditionally supported organization of this festival, whose magic fosters souls of many thousands of theater art lovers every year.

# Kreirali smo igralište za vrijeme koje dolazi

We created a playground for time to come

---

*Igralište u Ravnogorskoj ulici je realizovano kao projekat koji predstavlja kombinaciju modernog i kreativnog dizajna, savršeno uklopljenog u postojeću zelenu površinu. Njegove dobre strane su od dana otvaranja prepoznali najmladi stanovnici grada, čija graja i vesela igra na njegovoj površini ne prestaju, što je najbolja nagrada za naš trud.*

*Playground in Ravnogorska Street was realized as a project representing combination of modern and creative design, perfectly combined with existing green surface. Its good features have been recognized by the youngest citizens from the very day of its opening, whose excitement and joyful play on its ground does not stop, which is the best reward for our efforts*

**SR** Vođeni idejom da su dječiji smijeh i igra najveće vrijednosti na svijetu, 2017. smo 'debelo zavrnnuli rukave' i učinili da staro igralište u banjalučkom naselju Nova varoš dobije sasvim novo lice.

Elnos Grupa je u saradnji sa partnerskom kompanijom „Tenzo“, na 450 metara kvadratnih starih igrališta u Ravnogorskoj ulici, izgradila novo, kreativno autorsko igralište čiji kapacitet omogućava da se na njemu istovremeno igra 70 mališana.

Moderne igračke, među kojima su neke prvi put postavljene u RS i BiH, već su na dan otvaranja izazvale ogromno oduševljenje mališana, što je nama u Elnos Grupi najbolja potvrda da se naš zajednički trud u potpunosti isplatio.

Projekat izgradnje ovog igrališta je realizovan u okviru javno-privatnog partnerstva Grada

Banjaluka sa društveno odgovornim kompanijama, a u skladu sa neprofitnim pravilima savremenog vida donatorstva.

**MALI RAJ ZA NAJMLAĐE**

Branko Torbica, direktor kompanije Elnos BL je istakao da je igralište u Ravnogorskoj dar djeci ovoga grada i da njegovo otvaranje nosi simboličnu poruku za odrasle.

„Nikada ne smijemo zaboraviti na svoju primarnu obavezu da najmlađima pružimo sigurno, lijepo i veselo djetinstvo“, rekao je Torbica i podsjetio da je novo igralište izgrađeno po najsavremenijim evropskim trendovima.

„Ovaj projekat odiše duhom igara budućnosti i istovremeno predstavlja savršeno uklopljeno parče dječijeg carstva u prirodno bogatom zelenilu ove lokacije“, rekao je Torbica.



Elnos Grupa je izgradila dizajnersko igralište u Banjaluci  
Elnos Group constructed creative playground in Banja Luka

Svaka zona novog igrališta u Ravnogorskoj je projektovana tako da prati posljednje trendove inovacija u stvaranju igara koje aktiviraju kreativnost i motorički razvoj djece.

#### **BEZ STRAHA OD PADA**

Igralište je specifično i po tome što je u cijelosti pokriveno šarenom sigurnosnom podlogom, koja u kombinaciji sa modernim igračkama formira kreativnu cjelinu, sa odličnim uslovima za igru i fizičke aktivnosti.

Inače, radi se o jedinom igralištu u gradu čija je površina u potpunosti pokrivena sigurnosnom podlogom, što znači da se mališani na cijeloj njegovoj površini mogu bezbrižno igrati bez opasnosti od povreda.

**EN** Lead by idea that child laughter and play are the most important values in the world, in 2017 we gave our best and made an old playground new in Banja Luka part of town Nova Varoš.

Elnos Group, cooperating with partner "Tenzo", on 450 square meters of old playground in Ravnogorska Street, built a new, creative author playground whose capacity provides possibility for 70 children to play at the same time.

Modern toys – some of them have been installed in the RS and BiH for the first time, on the very opening day wowed little ones, which, for us in Elnos Group, is the best confirmation that our joint effort pays completely.

Project of constructing this type of playground was performed within public-private par-

tnership of the Banja Luka City with socially responsible companies and in line with non-profit rules of modern type of donations.

#### **SMALL HEAVEN FOE THE YOUNGEST**

Branko Torbica, Director of the company Elnos BL stated that playground in Ravnogorska Street was a gift to children in this town and that its opening has a symbolic message for grown-ups.

"We should never forget our primary obligation to provide the youngest with safe, beautiful and joyful childhood", said Torbica and reminded that this playground was built in line with most modern European trends.

"This project has a spirit of games in future and at the same time, it represents perfectly fitted piece of children kingdom in naturally rich greenery of this location", said Torbica.

Each zone of this playground in Ravnogorska Street has been designed to follow in the latest trends of innovations in creating games activating creativity and motoric development of children.

#### **NO FEAR FROM FALL**

Playground is specific since it is entirely covered by colorful safety mat, which combined with modern toys, forms creative whole, with excellent conditions for play and physical activity.

Likewise, this is the only playground in town whose entire surface has been covered by safety mat, which means that little ones can safely play on entire surface with no fear to get injured.

#### **SR BIZNIS KONFERENCIJA GODINE**

Iako postoji tek dvije godine, „Jahorina ekonomski forum“ je uspio za ovo kratko vrijeme da postane jedna od najprestižnijih biznis konferenciјa u Republici Srpskoj.

Elnos Grupa je prošle godine podržala ovu ekonomsku manifestaciju, koja je 27. i 28. aprila okupila više od 350 delegata, predavača i predstavnika medija u hotelu „Termag“ na Jahorini.

#### **EN BUSINESS CONFERENCE OF THE YEAR**

Although it has been existent for only two years, "Jahorina economic forum" has managed to become one of the most prestigious business conferences in the Republic of Srpska for this short period.

Last year Elnos Group supported this economic event, which gathered more than 350 delegates, presenters, media representatives in Hotel "Termag" on Jahorina on April 27 and 28.



# Držimo dobar kurs

## Prijateljstvo je više od team buliding-a

We keep up to good course  
Friendship is more than team building

“ Nije ni godina otkad sam upoznao nove prijatelje i ta prijateljstva su se ovdje potvrdila. Neka traje, hvala vam.

“ It has not been a year yet since I met new friends and those friendships have been confirmed here. Let's make it last, thank you.

JURE JAGRIČ

direktor ENS Slovenija  
Director of ENS Slovenia

“ Druženjem u odličnoj domaćinskoj atmosferi smo dali lijep lični pečat zajedničkom trenutku, ali i vremenu koje je tek pred nama.

“ Socializing in an excellent domestic atmosphere we gave personal notion to common moment but also to our time yet to come.

IVICA JAKOVLJEVIĆ

direktor Elnosa Srbija  
Director of Elnos Serbia

“ Pozitivna energija, opuštena atmosfera, sjajna iznenadenja... Ovo je druženje kojeg ću se sjećati zauvijek.

“ Positive energy, relaxed atmosphere, great surprises... This is event I will always remember.

KRISTIJAN AINOVSKI

direktor Elnosa Makedonija  
Director of Elnos Macedonia

“ Učesnici iz SFRJ u malom su oslikali ono što je Elnos Grupa uspjela da ostvari u godinama za nama.

“ Participants from SFRY in a summary reflected what Elnos Group had managed in years behind us.

VLADIMIR IVANOVIĆ

direktor Elnosa inženjeringu Crna Gora  
Director of Elnos Engineering Montenegro



**Pozdrav sa Jadrana**  
*Greeting from Adriatic Sea*



Maratonci bili na visini zadatka  
Marathon runners at their best



Miroslav Tuvic istračao pariški maraton  
Miroslav Tuvic run Paris marathon

## **SR 'ELNOSOVCI' TRČALI BANJALUČKI I LJUBLJANSKI MARATON**

Predstavnici Elnos Grupe su zajedno sa mnogo-brojnim ljubiteljima trka na duge staze, pokazali svoju sportsku spremnost i odvažnost na dva maratona, banjalučkom i ljubljanskom.

Oba maratonska takmičenja su za naše odvažne učesnike bili prilika da daju odgovor na pitanje - kako se gradi timski duh, ali i da simbolično pokažu da su uspjesi dostižniji ukoliko ste spremni da strpljivo, istrajno i dugo idete ka cilju.

Vjerujemo da i ove godine naše timove čekaju novi sportski uspjesi.

## **EGZOTIČNO PUTOVANJE NA DESTINACIJE IZ MAŠTE**

Mapa osmomartovskih putovanja ženskog dijela naše Grupe, bogatija je za nekoliko prelijepih destinacija, a to su: Milano, Đenova, Činkve Tere, San Remo, Monako i Pjaćenca. U ovo nezaboravno putovanje saželi su se koloristični pejzaži, jedinstvene boje i mirisi Ligurske rivijere i Azurne obale, smijeh i poseban šarm naše vesele grupe. Obišle smo fantastične lokacije, provele nezaboravne dane zajedno, a poseban ukras ovog putovanja su jedinstveni Činkve Tere i Monako.

## **EN 'ELNOS STAFF' RUNNING ON BANJA LUKA AND LJUBLJANA MARATHON**

Representatives of Elnos Group, along with many long-trail lovers, showed their sport readiness and bravery on two marathons in Banja Luka and Ljubljana.

Both marathon competitions, for our daring participants, were a chance to answer the question-how to build a great team spirit but also to show that successes are easier to reach if you are ready to reach the aim patiently, persistently and long.

We believe that in this year new sport successes are before our teams.

## **EXOTIC TRAVEL TO FANTASY DESTINATIONS**

Map of Eight of March travels of female part of our Group, enriched by several beautiful destinations as follows: Milan, Genoa, Cinque Terre, San Remo, Monaco and Piacenza. This unforgettable travel covered picturesque landscapes, unique colors and smells of Liguria Riviera and Azure Coast, laughter and special charm of our joyful group. We visited fantastic locations, spent unforgettable days together and special places were unique Cinque Terre and Monaco.

## **NAJVIŠE KILOMETARA IZA MIROSLAVA TUVIĆA**

NAJPOSVEĆENIJI UČESNIK OBA MARATONA JE NAŠ KOLEGA MIROSLAV TUVIĆ, DIREKTOR SISTEMSKE PRODAJE ELNOS GRUPE, KOJI JE ZA SADA ISTRAČAO NEKOLIKO MARATONA ŠIROM EVROPE. ON JE OVE GODINE, ZAJEDNO SA EKIPOM SVOJE KOMPANIJE, ISTRĀO CIJELU DUŽINU BANJALUČKOG I POLA DUŽINE LJUBLJANSKOG MARATONA. ČESTITAMO!!!

## **MOST KILOMETERS FOR MIROSLAV TUVIĆ**

THE MOST DEVOTED MEMBER OF BOTH MARATHONS IS OUR COLLEAGUE MIROSLAV TUVIĆ, DIRECTOR OF SYSTEMS SALE OF ELNOS GROUP, WHO HAS RUN SEVERAL MARATHONS SO FAR THROUGHOUT EUROPE. THIS YEAR, WITH A TEAM FROM HIS COMPANY, HE RAN ENTIRE BANJA LUKA MARATHON AND HALF OF LJUBLJANA MARATHON. CONGRATULATIONS!!!



Ženska ekipa uživala u čarima Italije Women's team enjoying beauties of Italy

## **SR SJAJAN TIM BILDING**

Snijeg ni u najmanjoj mjeri nije pokvario tradicionalno održavanje tim bilding druženja za prijatelje i poslovne partnerne sektora prodaje Elnos Grupe.

Gotovo 200 naših saradnika provelo je nezabavne trenutke na olimpijskoj planini Jahorina.

Odlično raspoloženje, puno zabave, smijeha i sportskih igara, kao i poslovne prezentacije, učinili su da tim bilding na najbolji način opravda svoj ovogodišnji moto – „Nastavljamo putem dobre energije“.

U okviru sportskog dijela programa gosti i domaćini su ovaj put imali priliku da odmjere snage u igrama organizovanim na tri poligona prekrivena

snijem, a igrao se: babl fudbal, hokej sa metlama i paintball.

Druženje na Jahorini je okončano zabavom koja je protekla u odličnoj atmosferi. Nadamo se da će se naši dragi partneri i gosti dugo sjećati prijatnih utisaka ponesenih sa ovog druženja.

## **EN GREAT TEAMBUILDING**

Snow did not spoil traditional teambuilding for friends and business partners of Sales sector of Elnos Group at all.

Almost 200 of our partners spent unforgettable moments on the Olympic mountain Jahorina.

Great mood, lot of fun, laughter and sports games, as well as business presentation, made teambuilding justify its motto in the best way – “We continue the path of good energy”.

Within sport part of program, guests and hosts this time had an opportunity to compete in games organized on three fields covered with snow. They played: bubble football, hokey with brooms and paintball.

Event on Jahorina ended by a party of great atmosphere. We hope that our dear partners and guests shall remember pleasant impressions of this gathering for a long time.



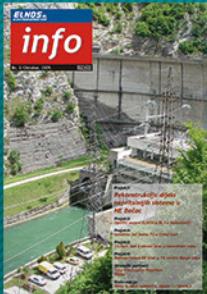
**Odlična zabava u režiji sektora Elnos prodaje**  
Fabulous entertainment organized by Elnos Sales Department

**Geotermalna elektrana Krafla**  
**Radovi na GIS 245/132/12 kV TS „Krafla“ 49**  
Geothermal power plant Krafla  
Works on GIS 245/132/12 kV SS "Krafla" 49



# POZNAJEMO SE 10 GODINA

WE KNOW EACH OTHER FOR **10 YEARS**



BROJ ISSUE 10

info  
ELNOS GROUP

Mart/March 2018  
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64 DOK VELIKI VULKAN SPAVA  
WHILE A BIG VOLCANO SLEEPS

44 VELIKI RIZIK  
POKLJUČNI VISION RISK  
WHEN ORGANIZATIONS  
BEATS HIGH RISK

67 TRG SLAVLJA NOVI  
ORIENTIR BEZGRADA  
SLAVLJA SQUARE NEW  
BELGRADE LANDMARK

ZVIJEZDA  
U USPONU  
OBNOVLJIVI  
IZVORI  
ENERGIJE

RISING  
STAR  
RENEWABLE  
ENERGY  
SOURCES

[elnosgroup.com/info-magazin](http://elnosgroup.com/info-magazin)

Već deceniju sa Vama dijelimo najzanimljivije trenutke fascinantnih projekata i poslovnih izazova sa kojima se suočavamo. Nadamo se da su Vas naše priče iznenadile, motivisale i učinile da vidite naš rad iz bliske perspektive. Bićemo Vaš vjeran saputnik u godinama koje predstoje.

For a decade we share with you the most interesting moments, fascinating projects and business challenges we are facing. We hope that our story surprised you, motivated and make you can see our work from a close perspective. We will be your faithful companion for upcoming years.

Uživajte u čitanju!  
Enjoy reading!