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ELNOS
GROUP



USPJEH ELNOS GRUPE U „ZEMLJI VATRE I LEDA“

SUCCESS OF ELNOS GROUP IN “THE LAND OF FIRE AND ICE”

Projekti / Projects:

**NOVI ŽIVOT MINI-
-HIDROELEKTRANA**
NEW LIFE FOR MINI-HYDRO
POWER PLANTS

Projekti / Projects:

**IZRADA PRAVOG DŽINA
ODLAGAČ 12.000**
CONSTRUCTING REAL GIANT
SPREADER 12.000

Projekti / Projects:

**PROJEKTI U VELIKOM INVESTICIONOM
CIKLUSU ELEKTROPRENOSA BIH**
PROJECTS IN BIG INVESTMENT CYCLE OF
ELEKTROPRENOS BIH



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Dragi prijatelji, poštovani partneri,

U savremenom dobu sektor energetike je generator razvoja uspješnih privreda i ekonomija. Koncern Elnos Grupe aktivni je učesnik u ovom razvoju, kome svakodnevno doprinosi svojim znanjem, tehnologijama i stručnošću svojih operativnih timova. Zbog toga, upravo o razvoju, njegovom značaju i snazi energije razvoja pišemo u ovom broju časopisa.

Svaki projekat, ponuda, događaj i svaka stranica časopisa, dio su cjelokupne priče našeg napredovanja. Put do pozicije potvrđenog lidera i nosioca razvoja u oblasti energetike nije bio lak. Savladali smo brojne izazove, među kojima su i najdelikatniji projekti u ekstremnim i najsurovijim uslovima rada, ali i ekspertske projekti za koje je potreban vrhunski naučni pristup. Jasna vizija i spremnost svih zaposlenih u kompaniji da je ostvare, rezultirala je snažnom energijom našeg razvoja. Ostvarili smo kontinuitet rasta koncerna, njegovo trajno pozicioniranje i ekspanziju okrunjenu uspjehom na dalekom Islandu.

Ovu pozitivnu energiju i radost stvaranja dobrih rezultata i priča koje će doprinijeti održivoj energetskej budućnosti, želimo podijeliti sa vama. Ponosni smo što je ENERGIJA RAZVOJA tradicija, prošlost i budućnost naše ELNOS GRUPE.

Uživajte čitajući,

Dear friends and partners,

In modern time, energetics sector is generator of development of successful economy and economics. Concern of the Elnos Group is an active participant of this development. It contributes this development on daily basis through its knowledge, technologies and skill of its construction division teams. Due to this, development, its significance and development energy is actually what we are writing about in this issue of our magazine.

Each project, offer, event and each page of the magazine are parts of whole story. Road to the position of established leader and head of the development in the energetics sector was not an easy one. We overcame numerous challenges – the most difficult projects in extreme and the harshest working conditions are among these – as well as expert projects, which asked for proficient scientific approach. Clear vision and readiness of all employees of the company to achieve this resulted in strong energy of our development. Our concern grew continuously and it was crowned by its permanent position and expansion on the distant Iceland.

We would like to share this positive energy, joy of achieving good results and stories contributing sustainable energy future with you. We are proud that DEVELOPMENT ENERGY is tradition, past and future of our ELNOS GROUP.

Enjoy reading,

Mirjana Štrbac

Glavni i odgovorni urednik / Editor in Chief

Menadžer za korporativne

komunikacije / Manager of Corporate

Communications





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SR Mijodrag Čitaković jedan je od istaknutih stručnjaka u Srbiji i regionu u oblasti hidroenergije. To potvrđuju ne samo prestižne nagrade za rad i brojni sertifikati za stručnost i znanje, već i veliki autoritet i poštovanje koje uživa kod stručne javnosti, kolega i sugrađana. Svoju bogatu karijeru gradio je u Hidroelektrani Bajina Bašta, stepenik po stepenik. Radio je na velikim projektima u Evropi i u svijetu. Jedini je stručnjak iz Elektroprivrede Srbije koji je u protekloj deceniji direktno rukovodio revitalizacijom dvije hidroelektrane – reverzibilne i protočne HE Bajina Bašta. Svoju bogatu i plodnu karijeru u EPS-u okončao je odlaskom u penziju sa mjesta direktora Drinsko-limskih hidroelektrana. Stvaralačka energija ovog velikog čovjeka i marljivog stručnjaka, od septembra 2015. godine oplođuje se sjajnim rezultatima u Elnos Grupi, gdje radi na mjestu pomoćnika direktora inženjeringa za elektrane i obnovljive izvore energije.

Da li je po završetku izuzetne karijere inženjera elektrotehnike u EPS-u Elnos Grupa bila vaš prvi izbor? Da li ste i ranije planirali da nastavite sa radom u privatnom sektoru ili je inicijativa potekla iz Elnosa?

Po završetku karijere osjetio sam da mogu još uspješno da radim kao inženjer elektrotehnike i da svoje ogromno iskustvo i znanje prenesem mlađima. Moram reći da sam tokom karijere uvijek uspijevao da direktno učestvujem u rješavanju tehničkih problema na terenu, pa odluku da nastavim rad u struci nije bilo teško donijeti, jer se nikada nisam udaljio od tehnike. Imao sam više ponuda da nastavim rad u inostranstvu, na velikim hidro-objektima kao konsultant. Odlučio sam se za Elnos, jer sam znao da je to stabilna kompanija koja ima znanja i potencijala da bude vodeća kompanija na Balkanu u sektoru energetike.

Prvi projekat na kome ste kao direktor Hidroelektrane Bajina Bašta saradivali sa tada Elnosom BL je revitalizacija ove hidroelektrane. Ujedno, ovo je bio i prvi veći projekat Elnosa u oblasti hidroenergije. Šta biste izdvojili u vezi sa tom saradnjom?

Elnos je ušao u posao na revitalizaciji HE Bajina Bašta, pošto jedan od izvođača nije mogao da ispuni

ugovorne obaveze. Moji saradnici i ja izabrali smo i uključili Elnos u posao. Pokazalo se da je ovo bila prava odluka, jer su dolaskom Elnosa nestali problemi koje smo imali sa prethodnim izvođačem. Organizacija, kvalitet i efikasnost Elnosa bili su za čistu desetku. Ovdje se pokazalo da Elnos ne čine kamioni, alati i oprema, nego ljudi sa znanjem i kvalitetom.

Od tog perioda do danas Elnos Grupa je u oblasti elektrana i OIE realizovala niz značajnih projekata. Kako vidite ovu oblast našeg profolija u budućnosti?

Elnos je počeo sa revitalizacijom HE Bajina Bašta, a to iskustvo bilo je dragocjeno, kako bi se u oblasti elektrana i OIE iskazao u realizaciji više projekata. Sa iskustvom stečenim na izgradnji i revitalizaciji hidro, termo i elektrana na vjetar, biogas i biomasu, u budućnosti vidim Elnos kao lidera na prostoru Balkana.

Evidentan je uspjeh Grupe u oblasti hidroenergije u regionu. U realizaciji su dva kapitalna projekta u Srbiji i jedan u RS. Šta je najznačajnije što Elnos Grupa dobija učešćem na ovim projektima?

Stručni kadar je kroz poslove na hidroelektranama stekao dragocjena znanja koja će Elnos Grupa umjeti da iskoristi za nove poslove. Najveća dobit su znanje i iskustvo stečeno radom na gore pomenutim objektima.

Vi ste pripremili projekat revitalizacije HE Zvornik. Koliko je zahtjevna priprema četvoro godišnjeg posla?

Projekat revitalizacije HE Zvornik pripreman je preko

dvije godine. Njime su morale da se definišu i uzmu u obzir nove tehnologije, novi materijali i nova tehnička rješenja, a sve u cilju da revitalizovana elektrana bude kvalitetnija i savremenija, kao i da traje duže od stare. Zna se da je veliki broj stručnjaka otišao iz struke i da je bio izazov okupiti prave firme i ljude da se napravi što bolji projekat.

Jedan od kapitalnih projekata EPS-a u kome Elnos Grupa učestvuje jeste i prvi 'zeleni' projekat u oblasti rudarstva u EPS-u. Šta biste istakli u vezi sa ovim projektom?

Projekat u kome Elnos Grupa učestvuje jeste Odlagač 12.000 u TE Kolubara. Već dvije godine naši stručnjaci rade na tom projektu u saradnji sa drugim našim firmama i za sada on ide svojim tokom. Ovo je znak da Elnos Grupa ulazi i u velike poslove, u vezi sa rudarstvom. Na ovom projektu se vidi da naši stručnjaci mogu na domaćem tržištu uraditi dio opreme i dijelova koji se ugrađuju u sam odlagač, što je priznanje domaćim firmama da mogu uraditi kvalitetnu opremu.

Prilikom dodjele priznanja za doprinos razvoju EPS-a izjavili ste da zaokruženje tehničkih i tehnoloških procesa uz maksimalno korištenje domaćih preduzeća i domaće pameti treba da bude trajni zadatak EPS-a, koji bi tako jačao domaću privredu. Može li se reći da je jačanje domaće privrede vaša životna odrednica?

Mislim da mi imamo dovoljno dobrih stručnjaka čiju energiju treba iskoristiti kako bismo zaokružili komplikovane tehnološke procese i realizovali ih u našim domaćim fabrikama i sa našim kompanijama. Cijeli život i sebe posvetio sam angažovanju što više domaćih kompanija u izgradnji i održavanju EPS-a. Veoma je značajno, uz strane partnere, uključiti domaću privredu u rješavanje tehničkih problema i kvalitetno vođenje radova, čime se polako vraća povjerenje koje su naše kompanije imale na internacionalnom tržištu u prethodnom periodu. Kada se te strane kompanije uvjere da dobro radimo, preporučice nas i internacionalnim investitorima.

Da li je vaš angažman u Elnosu usko vezan za jačanje domaće privrede i pozicija na internacionalnom planu?



“Elnos is a world company and my engagement in Elnos includes engagement in improvement of relationship with worldwide companies with maximum participation of national economy”

Elnos je svjetska kompanija, a moje angažovanje u Elnosu podrazumijeva angažovanje na unapređivanju odnosa sa svjetskim kompanijama, sa maksimalnim uključivanjem domaće privrede, gdje god za to postoji mogućnost.

Nekada je domaća privreda imala značajan udio u izgradnji energetske kapaciteta u svijetu. Koliko je važno da naše kompanije i Elnos Grupa budu aktivni učesnici u oblasti elektroenergetike na internacionalnom planu?

Reference Elnosa su značajne i one, uz sticanje iskustva na izgradnji i revitalizaciji hidro, termo i elektrana na vjetar, biogas, biomasu, otvaraju vrata Elnosu da se takmiči i na svjetskom tržištu. Radeći na elektroenergetskim objektima Elnos, polako a sigurno, aktivno učestvuje na internacionalnom tržištu, jer je tržište kod nas ograničeno.

Vi ste iskustva sa vodećim kompanijama sticali i tokom rada u Evropi i u svijetu. Koji je najveći projekat u kome ste učestvovali?

Radio sam na više velikih projekata kod nas i u svijetu. Najveći projekat koji sam radio u inostranstvu jeste hidroelektrana Hadita u Iraku, snage 770 MW. To je za mene bilo najveće iskušenje, kada odete u tuđinu i morate da pokažete svoje znanje. Tada nije bilo interneta i brzih veza da se konsultujete sa nekim, već sami donosite odluke.

Poznato je da vam je svaki kWh zlata vrijedan. Da li svoju profesiju smatrate jednom od privilegovanih?

Elektroenergetika je grana bez koje se ne može. Danas se ne može ništa zamisliti bez energije i kako je to najznačajnija oblast, time je i moja profesija privilegija, jer se bavim nečim što je veoma važno.

Šta bi bila vaša poruka za mlade inženjere i za mlade ljude na početku karijere?

Mladim ljudima bih preporučio da je rad i samo rad, uz veliko angažovanje i učenje, garancija uspjeha.

Koliko je za vašu karijeru i uspjeh važna porodica?

Porodica mora da pomogne svakom stručnjaku da uspije, a on tu podršku treba da vrati porodici, tako da su uzajamna pomoć i razumijevanje garancija uspjeha.

EM Mijodrag Čitaković is one of prominent experts in Serbia and region in the field of hydropower. This is supported not only by prestigious awards and numerous certificates for skill and knowledge but also a large authority and respect he is provided with from professional public, colleagues and co-citizens. He built his rich career at the Hydro Power Plant Bajina Bašta, step by step. He performed big projects



Mijodrag Čitaković while awarded recognition for contribution to the EPS development

cts in Europe and worldwide. He is the only expert from Elektroprivreda Srbije, who directly managed upgrade of two hydro power plants in the last decade – reversible and flow HPP Bajina Bašta. His rich and gorgeous career in the EPS ended when he had been retired from the title of Director of Drina-Lim hydro power plants. Creative energy of this big man and industrious expert adds magnificent results to his career in Elnos Group, where he works at the title of Assistant Engineering Director for power plants and renewable energy sources since September 2015.

After ending career of electrical engineering Engineer in EPS, was Elnos Group your first choice? Have you planned earlier to continue working in private sector or initiative came from Elnos?

After completion of my career, I felt I could still work successfully as an electrical engineering Engineer and to pass my huge experience and knowledge onto young generations. I have to say that in my career I have always managed to directly participate in solving technical problems on field, so that it was not very difficult to make decision to stay within profession. I have never pulled away from engineering. I had many offers to continue working abroad at big hydro-facilities as Consultant. I decided to choose Elnos since I knew it was a stable company with knowledge and capacity to be a leader on Balkans in the electrical energy sector.

Upgrade of the HPP Bajina Bašta was the first project you worked on as the Director of this hydro power plant with Elnos BL at the time. At the same time, this also was the first bigger project by Elnos in the field of hydro power.

What would you stress in the reference to this cooperation?

Elnos started the project of upgrade of the Hydro power plant Bajina Bašta since one of the Contractors could not fulfill its contract obligations. My associates and I selected and introduced Elnos in the project. It was proven to be the right decision since problems we had had with previous Contractor disappeared when Elnos came. Elnos' organization, quality and efficiency were straight ten. Then we saw Elnos had not been trucks, tools and equipment, but people with knowledge and quality.

Since then up to now, Elnos Group has performed a series of significant projects in the field of electrical power plants and RES. What is your vision of this field of our portfolio?

Elnos started upgrade of the HPP Bajina Bašta, and this experience was precious, in order to prove itself in realization of many projects in the field of electrical power plants and renewable energy sources. In future, I see Elnos as the leader in Balkans due to experience acquired in construction and upgrade of hydro, thermal and wind power plant, biogas and biomass.

Regional success of the Elnos Group in hydro-power system is evident. There are two major projects ongoing in Serbia and one in the RS. What are benefits for the Elnos Group from participation in these projects?

Professional staff acquired exquisite knowledge working in projects on hydro power plants and Elnos Group shall know how to use it for new projects. The biggest benefits are knowledge and experience acquired by work on the aforementioned facilities.

You prepared project of HPP Zvornik upgrade. To what extent preparation of four-year works is demanding?

We were preparing project of HPP Zvornik upgrade for over two years. It should define and take into account new technologies, new materials and new technical solutions, and all in the aim that revitalized electrical power plant to be of better quality and more modern as long as to last longer than the old one. It is the fact that a significant number of experts left the profession and it was a challenge to gather the right companies and people to make even better project.

One of the major projects of the EPS Elnos Group participates in is the first 'green' project in the field of mining in the EPS. What is to be stressed in the reference to this project?

Project the Elnos Group takes part in is Spreader 12.000 in the TPP Kolubara. Our experts have been working on this project for two years cooperating with our other companies and, for now, it is ongoing as planned. This is a sign that the Elnos Group participates in major projects related to mining, as well. This project is evidence that our experts can make a part of equipment and parts, which are being installed in the spreader itself, on our market, which is recognition that our companies are able to make equipment of good quality.

While awarded recognition for contribution to the EPS development, you stated that rounding of technical and technological processes with maximum use of national companies and national knowledge should be a permanent task of the EPS, which, hence, would make national economy stronger. Could we conclude that strengthening national economy is your life goal?

I believe we have enough good quality experts whose energy should be used in order to round up complicated technological processes and realize them in our national factories and with our companies. I dedicated my whole life and myself to engagement of as many national companies as possible in construction and maintenance of the EPS. It is very important, along with international

partners, to include national economy in solving technical issues quality works management, which, easily, regains trust our companies used to have on the international market in the previous period. One these international companies realize we work well, they will recommend us to the international investors.

Is your engagement in Elnos tightly connected to strengthening of national economy and positions on international plan?

Elnos is a world company and my engagement in Elnos includes engagement in improvement of relationship with worldwide companies with maximum participation of national economy wherever it is possible.

Domestic economy used to have a significant stake in construction of energy facilities in the world. To what extent it is important that our companies and Elnos Group are active participants in the field of electrical power system on international level?

Elnos' references are important. With acquiring experience in construction and upgrade of hydro, thermal and wind power plant, biogas and biomass, they enable Elnos to be competitive on the world market. Working on electrical power facilities, Elnos, slowly, but surely, actively participates in international market since our market is limited one.

You also acquired your experience with leading international companies while working in

Europe and worldwide. What is the biggest project you participated in?

I worked on many big projects in our country and in the world. The biggest project I worked on abroad is hydro power plant Hadita in Iraq, 770 MW power. It was the biggest challenge for me. Once you go abroad, you have to demonstrate your knowledge. At the time, there were no internet and speed connections to consult someone, but you had to make decisions by yourself.

You know that each kWh is extremely valuable. Do you think that your profession is a privileged one?

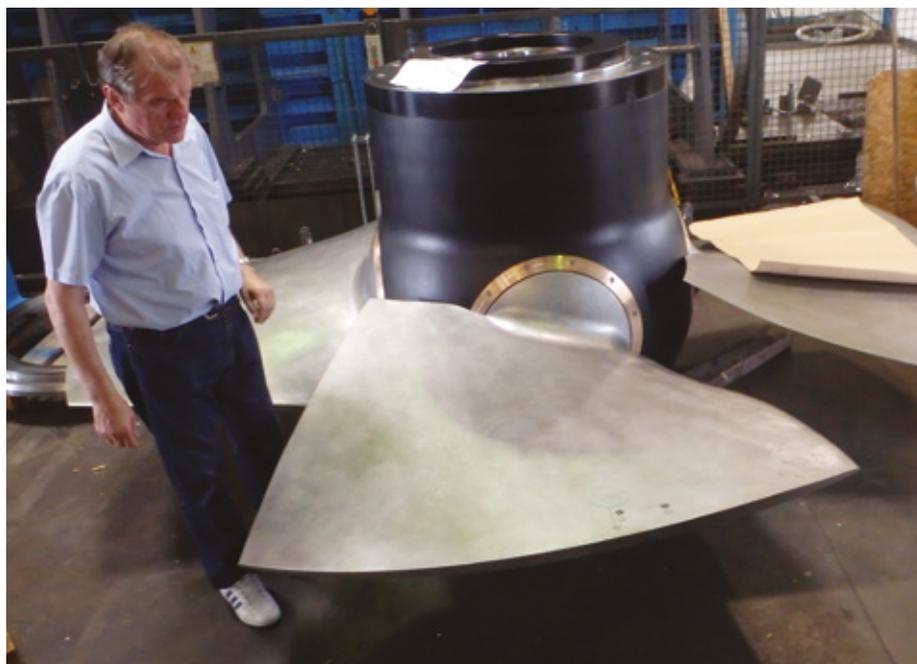
Electrical power system is economical branch we cannot live without. Today, you cannot imagine anything without energy. Since it is important field, hence my profession is privileged one because I deal with something extremely important.

What kind of message would you send to young engineers and young people at the beginning of their career?

I would recommend young people that work and nothing but the work, along with a great deal of participation and learning, guarantees success.

To what extent family is important in your career and success?

Family has to help each expert in his success, and he has to return this support to the family so that mutual support and understanding guarantee success.



FAT turbinskih agregata za MHE Bočac 2 / FAT of turbine generators for MHPP Bočac 2

SVEČANOST POVODOM VELIKOG JUBILEJA

70 GODINA TRADICIJE I RAZVOJA

Ceremony for the big jubilee 70 years of tradition and development



Na evropskom tržištu Elnos je već danas prvoklasni sagovornik kada je u pitanju oblast energije, i na ovoj činjenici, poslovanje kompanije može biti okrunjeno samo uspjehom



70

GODINA

ENERGIJA RAZVOJA

ELNOS GRUPA

Even today, Elnos is first-class partner at the European market when talking about energy, and, based on this fact, company business operations can be crowned by success only



Christer Asp, Milan Martinović i Borko Torbica / Christer Asp, Milan Martinović and Borko Torbica



SR U vremenu u kome živimo i radimo, svaka nova godišnjica uspješnog poslovanja privrednih subjekata zaslužuje poštovanje. A kada se obilježava sedam decenija uspješnog rada na tržištima jugoistočne Evrope, Islanda, Švedske, Njemačke i Austrije, i kada se istovremeno partnerski saraduje sa četrdeset najpoznatijih međunarodnih korporacija, koncerna i kompanija iz oblasti energetike i telekomunikacija, onda je to poslovni podvig čiji primjer treba istaći i slijediti.

Jubilarnih 70 godina tradicije i razvoja Elnos Grupe obilježeno je svečanim prijemom u hotelu Hyatt Regency u Beogradu, 17. decembra 2015. godine. Elnos Grupa je na svečanom prijemu ugostila više stotina zvanica, među kojima i predstavnike Vlade Republike Srbije i Vlade Republike Srpske, članove diplomatskog kora, predstavnike elektroprivreda iz regiona i šire, zatim predstavnike poslovnog sektora, partnere, saradnike i prijatelje kompanije.

Svečanost je otvorio predsjednik Elnos Grupe g. Dušan Torbica, koji je istakao: „Zaposleni u Elnos Grupi, naši partneri, saradnici, svi su suštinski utkani u ono što danas sa pono-

som ističem – u stvaranje trajnih vrijednosti za buduće generacije.“ Torbica se osvrnuo na ostvarene rezultate i planove: „Tokom proteklih godina naša grupa je proširila svoj obim djelovanja. Okrećemo se prostoru Evropske unije na veliko, obostrano zadovoljstvo. Otvaramo se prema tržištima Austrije, Njemačke, Italije i Slovenije. Imamo izuzetno značajna iskustva na poslovima u Švedskoj i na Islandu, gdje se naš tim koji djeluje na skandinavskom tržištu, širi. Ali, osim Evrope, naš plan je da poslove proširimo i na druge kontinente, prije svega na Afriku.“

Okupljenim zvanicama obratio se ministar privrede u Vladi Republike Srbije g. Željko Sertić, koji je u svoje ime i ime Vlade izrazio čestitke povodom jubileja, kao i svoju nadu da će putem uspjeha Elnos Grupe krenuti i drugi privredni subjekti koji žele da budu aktivni privredni dio naše budućnosti. Sertić je istakao: „Mi u Srbiji nemamo veliki broj domaćih kompanija koje imaju tako velike rezultate i tako veliku snagu iza sebe kao što ima Elnos Grupa“.

U ime suvlasnika u Elnos Grupi prisutnima se obratio g. Georg Spiegelfeld, koji je u ime suvla-

snika iskazao zadovoljstvo i ponos što su svojim partnerstvom doprinijeli rastu koncerna i njegovom trajnom pozicioniranju: „Kako mogu zaključiti iz razgovora sa učesnicima na tržištu, Elnos je već danas prvoklasni sagovornik kada je u pitanju oblast energije, i na ovoj činjenici, poslovanje kompanije može biti okrunjeno samo uspjehom.“

U završnici svog obraćanja, Torbica je sumirao rezultate ekspanzije kompanije: „Danas je Elnos Grupa internacionalni elektroenergetski ugovorni koncern, koji sa ponosom baštini stvaralačku tradiciju dugu sedam decenija i obogaćuje je nizom uspješno realizovanih projekata. Naša poslovna grupacija je bila i ostala jedan od najznačajnijih poslovnih subjekata u regionu jugoistočne Evrope, a posljednjih godina predstavlja i veoma kvalitetnog partnera liderskim korporacijama iz oblasti elektroenergetike u Evropi i u svijetu.“

EN Living and working in our times, every new anniversary of successful business operation for the companies deserves a respect. Celebrating seven decades of successful work on



Dušan Torbica, predsjednik Elnos Grupe
Dušan Torbica, President of the Elnos Group

„Zaposleni u Elnos Grupi, naši partneri, saradnici, svi su suštinski utkani u ono što danas sa ponosom ističem – u stvaranje trajnih vrijednosti za buduće generacije.“

Dušan Torbica,
Predsjednik Elnos Grupe

“Elnos Group employees, our partner, associates are all essentially a part of what I emphasize today proudly – creation of long-lasting values for the future generations.”

Dušan Torbica,
President of the Elnos Group

the markets such as South-East Europe, Iceland, Sweden, Germany and Austria, and having partnerships with forty best known international corporations, concerns and companies in the field of electrical power and communications at the same time, then it is a business endeavor whose example should be noticed and followed in.

Elnos Group celebrated 70-years jubilee of tradition and development at the formal ceremony organized at the Hotel Hyatt Regency in Belgrade on December 17, 2015. Elnos Group welcomed several hundred of guests at the ceremony, among which were the representatives of the Government of the Republic of Serbia, Government of the Republic of Srpska, members of diplomatic corps, representatives of electrical power system from the region and beyond, as well as representatives of business sector, partners, associates and friend of the company.

Ceremony was opened by Mr. Dušan Torbica, the President of the Elnos Group, who said: “Elnos Group employees, our partner, associates are all essentially a part of what I empha-

size today proudly – creation of long-lasting values for the future generations.” Mr. Torbica talked about accomplished results and plans: “In the past years, our Group expanded its field of activity. We are significantly turning to the European Union region for pleasure of us all. We are opening doors for markets in Austria, Germany, Italy and Slovenia. We have very important experience in business activities in Sweden and Iceland, where our Scandinavian team expand. But, apart from Europe, we plan to expand our activities to other continents as well, Africa in the first place.”

Mr. Željko Sertić, the Minister of Economy in the Government of the Republic of Serbia, who congratulated for the jubilee on his behalf and on behalf of the Government, addressed the gathered guests and said he hoped other companies would follow in successful steps of the Elnos Group, those who want to be active economical part of our future. Sertić said: “We, here in Serbia, do not have a big number of national companies with such significant results and so big power the Elnos Groups has to back them up”.

On behalf of co-owner in Elnos Group, Mr. Georg Spiegelfeld addressed the guests and expressed his satisfaction and pride that their partnership contributed growth of the concern and its long-lasting positioning: “As far as I can see from talking to market participants, even today, Elnos is the first class partner in the reference to the electrical power field on the European market and, based on this fact, company business operations can be crowned by success only.”

At the end of his address, Mr. Torbica summarized results of the company expansion: “Nowadays, Elnos Group is an international electrical power system contractual concern, who takes care of creative tradition seven decades long proudly and it enriches it by a series of successfully performed projects. Our business group has been and still is one of the most important business entities in the region of the South-East Europe, and, in past few years, it also represents a partner of a very good quality for leader corporations in the field of electrical power system in Europe and throughout the world.”



Međunarodni panel „Energija budućnosti“

International panel “Energy for the future”

SR U radnom dijelu obilježavanja značajnog jubileja, Elnos Grupa organizovala je Međunarodni panel „Energija budućnosti“. Na panelu su priznati stručnjaci u oblasti elektroenergetike i privrede otvorili pitanje obezbjeđenja najkvalitetnijih tehnoloških rješenja za ostvarivu energetske budućnosti. Panel je održan 17. decembra 2015. godine u svečanoj sali Skupštine grada Beograda.

Međunarodnom panelu prisustvovalo je više od stotinu učesnika, između ostalih i predstavnici elektroprivreda iz regiona i susjednih zemalja, vodeći eksperti i poslovni partneri iz zemlje i inostranstva. Panel je otvorio pomoć-

nik gradonačelnika Beograda Borko Milosavljević, koji je istakao da Beograd priprema brojne projekte u oblasti OIE, koji će značajno povećati BDP zemlje.

„Energija budućnosti“ je tema koja zauzima najviše mjesto, ukoliko se posmatra kroz matricu prioriteta kojima se može obezbijediti civilizacijski održivi razvoj i riješiti problem zadovoljavanja energetske potreba. Danas se često u akademskim i javnim raspravama postavljaju retoričke dileme kojom od sljedećih resursa: vodi, hrani ili energiji, treba pristupiti kao najvažnijem za rješavanje i uspostavljanje održivog razvoja čovječanstva, konstatovano je

na panelu. Svaka ozbiljnija analiza koja u obzir uzima i sveukupnu zavisnost funkcionisanja čovječanstva kao cjeline, obezbjeđenje dovoljne količine energije bezrezervno prepoznaje kao primarni izazov za rješavanje u XXI vijeku.

U uvodnom dijelu panela, predsjedavajući i moderator panela dr Tihomir Simić, predsjedavajući Međunarodnog foruma o čistim energetske tehnologijama, istakao je ozbiljnost i urgentnost za savladavanje ovoga izazova. Metodologijom EU, koja je na strateški i egzekutivan način postavila prolazne i konačne ciljeve na horizontima sopstvenog energetske razvoja do 2020. i 2050. godine, ovi ciljevi ozvaničeni su



Učesnici Međunarodnog panela / Participants of International panel

kroz obavezujuću regulativu za sve njene članice i zemlje u procesu pridruživanja. „Za koncernne i kompanije iz oblasti elektroenergetike prisutne na međunarodnom panelu, koji predstavljaju potvrđene lidere i nosioce tehnološkog i operativnog razvoja u ovoj oblasti, jasno definisani evropski ciljevi predstavljaju otvoreni poziv za angažovanje punim kapacitetima na rješavanju problema energetske budućnosti, a time i uspješno ispunjenje njihovih poslovnih vizija i misija“, istakao je Simić.

U izlaganju o evropskim energetske razvojnim prioritetima, Hans-Peter Floren, partner Instituta za evropske poslove INEA iz Dizeldorfa i CEO FAKT Energy AG, naglasio je važnost usklađivanja zakonske regulative Srbije i zemalja regiona sa regulativom EU i smjernicama Energetske zajednice. Takođe, istakao je značaj uspjeha Elnos Grupe u realizaciji razvojnih infrastrukturnih projekata u regionu. Posebnu pažnju stručne javnosti usmjerio je na procese koji prethode investicijama u OIE i njihovu eksploataciju. Na pitanje da li bi investirao u Srbiji, Floren je kratko odgovorio: „Da, zato sam ovdje“.

Izuzetnu pažnju privuklo je izlaganje eksperta za EU tržište u Elnos Nordiku, Bo Norlina, jed-

nog od najuglednijih švedskih stručnjaka za razvojne projekte u skandinavskim zemljama. Norlin je govorio o internacionalnoj strukturi koncerna i podjednako osposobljenosti operativnih timova, bez obzira na to da li rade na Islandu u Švedskoj ili Srbiji. Pomenuo je niz referentnih projekata, od izgradnje više strateških prenosnih dalekovoda različitih naponskih nivoa u Švedskoj, do izgradnje najsloženijih infrastrukturnih objekata u regionu. Norlin je istakao da očekuje da ključne kompanije javnog sektora, kao što su EPS i EMS, iskoriste prisutnost i spremnost koncerna u Srbiji, da hrabrije uđu u modernizaciju postojećih resursa i investiranje u nova tehnološka rješenja i što prije postanu dio Super Grida – evropske pametne elektroenergetske mreže.

U ime EPS-a, kao učesnik panela nastupio je član Nadzornog odbora EPS-a prof. dr Aleksandar Gajić. Profesor Gajić je izložio elemente razvojne politike i strategije jedne od najvažnijih javnih kompanija u Srbiji i potencirao dostignuti stepen unapređivanja unutrašnje organizacije sa vizijom stvaranja visokoorganizovane i efikasne upravljačke strukture. Istovremeno, podvukao je značaj takvih promjena u odnosu na postavljene standarde Energetske zajednice i regulativu EU, kao i na usaglašenost sa važećim zakonima Srbije. „Kompanija EPS je još uvijek u procesu restrukturiranja i u narednom periodu će pored sveukupnog unapređivanja svoga rada i poslovanja biti opredijeljena ka podizanju energetske efikasnosti kroz korišćenje OIE“, zaključio je Gajić.

Potpredsjednica Upravnog odbora NALED-a Ana Brnabić je, kao panelista, podsjetila da se Srbija obavezala evropskoj Energetskoj zajednici da do 2020. podigne učešće obnovljivih izvora energije u ukupnoj potrošnji. „Neophodno je da se što prije pomirimo sa činjenicom da je to put kojim svijet ide i da situaciju što bolje koristimo za naše kompanije“, poručila je Brnabić. Takođe, ona je potencirala značaj inicijativa koje treba uputiti sa Međunarodnog panela „Energija budućnosti“, prvenstveno u cilju stvaranja cjelovitih društvenih uslova za izgradnju novog odnosa prema energiji kao osnovi održivog razvoja i budućnosti. Brnabić je zaključila da će NALED, kao aktivna asocijacija koja se zalaže za društveni progres, podržati sve napore Elnos Grupe da se visokotehnološka rješenja u domenu elektroenergetike što brže i što masovnije primjenjuju.

U završnici obraćanja panelista, potpredsjednik Privredne komore Srbije (PKS) Miroslav Miletić je posebno potencirao značaj energetike kao razvojnog resursa Srbije i pojasnio mjesto i ulogu PKS u procesima unapređiva-

nja nacionalne energetske bezbjednosti. Miletić je poručio da je 'zelena energija' razvojna šansa domaće ekonomije i da ona podrazumijeva uvođenje velikih promjena u proces proizvodnje i potrošnje, kao i primjenu inovacionih tehnologija koje će dovesti do otvaranja desetina hiljada novih radnih mjesta. Stranim investitorima u elektroenergetiku, Miletić je poručio da je PKS mjesto gdje se u cjelini mogu osloniti na sve elemente potrebne za poslovno planiranje i da postojanje koncerna kao što je Elnos Grupa daje mogućnost uspješnog otvaranja strateških partnerstava u javnom i privatnom sektoru.

Učesnici Međunarodnog panela „Energija budućnosti“ zaključili su da je obezbjeđenje energetske bezbjednosti zemalja regiona jugoistočne Evrope i Republike Srbije, osnova za izgradnju njihovih uspješnih privreda i ekonomija, te glavni investicioni i ekonomski pokretački proces koji može obezbijediti njihov progresivni i dinamični održivi razvoj.

Panel je zatvorio CEO Elnos Grupe Borko Torbica, ističući mjesto i ulogu kompanije u ovim procesima: „Mi koji smo osposobljeni i koji znamo da koristeći svoja znanja i najnovija tehnološka dostignuća možemo učiniti život boljim i sigurnijim za sve, moramo biti spremni na saradnju i partnerstvo. To je zadatak u kome javni i privatni sektor imaju potpuno podudaranje interesa. Elnos Grupa je spremna da kao internacionalni koncern sav svoj potencijal stavi u funkciju uspješnog ostvarivanja visoko postavljenih ciljeva, od lokalnih i regionalnih, do nacionalnih i globalnih projekata. Mi to znamo, hoćemo i možemo“.

EM In the working part of marking a significant jubilee, Elnos Group organized International panel "Energy for the future". At the panel, renowned experts in electrical power industry open an issue of provision of the best quality solutions for feasible electrical power future. Panel was held on December 17, 2015 at the Hall of the Belgrade City Assembly.

International panel was attended by more than one hundred of participants: representatives of electrical power industry from region and neighboring countries, leading experts and national and international business partners. Panel was opened by Borko Milosavljević, Assistant to the Mayor of Belgrade, who had said that Belgrade prepares numerous projects in the field of RES, which are to significantly increase GDP of the country.

"Energy for the future" is the topic that takes up the highest place if seen through matrix of priorities which provide civilization sustainable development and solve the problem of meet-



Tihomir Simić, Hans-Peter Floren, Bo Norlin, Aleksandar Gajić, Ana Brnabić, Miroslav Miletić

ing electrical power needs. Nowadays, in academic and public discussions, we often hear about rhetorical dilemmas which of the following resources – water, food or power – should be considered the most important for solving and establishing manhood sustainable development, Panel participants stated. Each more serious analysis, which also takes comprehensive dependency of manhood functioning as a whole into account, undoubtedly recognizes provision of sufficient amount of energy as primary challenge to face in 21st century.

In the introductory part of the Panel, Tihomir Simić, Ph. D., Panel moderator and Chairman of the International Forum for Clean Energy Technologies, stressed gravity and urgency of overcoming this challenge. By EU methodology, which set transient and final goals of horizons of own energy development by 2020 and 2050 in strategic and executive way, these goals were officially presented through binding regulation for all the members and countries going through EU integration process. “For concerns and companies in the field of electrical power system

present at the International panel, which are confirmed leaders and carriers of technological and operational development in this field, clearly defined European goals represent open invitation for engaging in full capacity in order to solve problems of energy future, but also successful fulfillment of their business visions and missions”, said Simić.

In presentation on European energy development priorities, Hans-Peter Floren, partner of the Institute for European Affairs INEA from Dusseldorf and CEO of the FAKT Energy AG, stressed importance of harmonizing legislative in Serbia and regional countries with EU legislative and directives of the Energy Community. Likewise, he also stressed significance of Elnos Group’s success in realization of developing infrastructural projects in the region. He directed special attention of professional public to processes preceding investments in RES and their exploitation. Asked if he would invest in Serbia, Floren replied shortly: “Yes, that’s why I am here”.

Special attention was drawn to presentation

made by the expert for EU market in Elnos Nordic, Bo Norlin, one of the best known Swedish experts for developing projects in Scandinavian countries. Norlin spoke about international structure of the Concern and equal skill of operational teams, regardless they work on Iceland, Sweden or Serbia. He mentioned a series of referent projects – from construction of numerous strategic transmission lines of various voltage levels in Sweden to construction of the most complex infrastructural facilities in the region. Norlin stressed he expects key companies from the public sector, such as EPS and EMS, to benefit from presence and readiness of the concern in Serbia, to be braver in modernization of the existing resources and investments in new technological solutions in order to become a part of Super Grid – European smart electrical power networks – as soon as possible.

Professor Aleksandar Gajić, Ph. D. and member of the Supervisory Board of the EPS, attended as the participant of the Panel on behalf of the EPS. Professor Gajić presented elements of developing politics and strategy one of the most impor-

tant public companies in Serbia and emphasized achieved degree of improving internal organization with vision of creating highly-organized and efficient managing structure. At the same time, he underlined significance of such changes in the reference to set standards of Energy Community and EU legislative, as well as to harmonization with positive laws in Serbia. "Company EPS still is in the process of restructuring and in the following period, apart from comprehensive improvement of its work and business operations, shall be dedicated to upgrading energy efficiency by using RES", concluded Gajić.

Ana Brnabić, the Vice President of the Managing Board of NALED, being the panelist, reminded that Serbia bound to the Energy Community that up to 2020 it would increase participation of renewable energy sources in overall consumption. "As soon as possible, it is necessary to be aware of the fact this is the way that world is going and to use the situation as well as we can for our companies", stated Brnabić. Likewise, she emphasized the importance of initiatives to be sent from the International Panel "Energy for the future", in the first place, in the

aim of creating integral social conditions for creation of new relation to energy being the base of sustainable development and future. Brnabić concluded that NALED, being active association assisting social progress, shall support all the efforts by Elnos Group to apply high-technology solutions in the field of electrical energy power as soon as possible and as much as possible.

At the end of panelists' addresses, Miroslav Miletić, the Vice President of the Serbian Chamber of Commerce (SCC), specially emphasized importance of energy being the developing resource of Serbia. He also explained position and role of the SCC in processes of improving national energy safety. Miletić sent a message that 'green energy' is a chance for development of national economy and that it understands introduction of big changes in the processes of production and consumption as well as in application of innovative technologies leading to opening tens of thousands of new work places.

As for foreign investors of electrical power system in Serbia, Miletić sent them a message that SCC is the place where they can completely rely to all the elements necessary for business

planning and that existence of concern such as the Elnos Group provides possibility for successful opening of strategic partnerships both in public and private sector.

Participants of the International Panel "Energy for the future" concluded that provision of energy safety for the countries of South-East Europe and the Republic of Serbia is the base for establishment of their successful economies and economics, as well as the main investment economic drive process able to provide their progressive and dynamic sustainable development.

Borko Torbica, CEO of the Elnos Group, closed the Panel emphasizing position and role of the company in these processes: "We, who are skilled and know how to make life better and safer for everyone through use of our knowledge and state-of-art technologies, we have to be ready for cooperation and partnership. This is a task where public and private sector harmonize their interests. Elnos Group, being international concern, is ready to use all of its capacity for successful accomplishment of highly set goals, in local, regional, national and global projects. We know it, we want it and we can do it".



Prepuna svečana sala Skupštine grada Beograda /Full Hall of the Belgrade City Assembly



USPJEH ELNOS GRUPE U

„ZEMLJI VATRE I LEDA“

SUCCESS OF ELNOS GROUP IN “THE LAND OF FIRE AND ICE”

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Elnos Grupa prerasla u aktivnog i ozbiljnog učesnika na tržištu Islanda, sa znatno širom paletom usluga i mogućnosti. Tendencija rasta u narednim godinama izvjesna

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Elnos Group became active and serious participant on Iceland market with significantly broader palette of services and possibilities. Growth tendency in the upcoming years is evident

SR U „zemlji vatre i leda“, Islandu, Elnos Grupa je početkom 2015. godine otvorila još jedno značajno poglavlje na internacionalnom nivou. Naša grupacija osnažena je novim predstavništvom, Elnos Iceland, sa sjedištem u dalekom Rejkjaviku. Na mapi naših referenci ucrtani su prvi projekti na 66. sjevernoj paraleli, u oblasti Arktičkog polarnog kruga.

Od osnivanja, naše prisustvo na ovom tržištu veoma je intenzivno. Ubrzo po otvaranju predstavništva potpisan je prvi ugovor sa islandskom elektroprenosnom kompanijom Landsnet. Već u maju 2015. počele su pripreme za početak radova na prvom projektu, koji je realizovan u južnom, tj. centralnom dijelu zemlje u ugovorenom roku, profesionalno, po svim standardima struke.

Direktor Elnos Iceland-a Milenko Majstorović kaže da su: „Rezultati definitivno bolji od očekivanih, pri čemu ne posmatram samo finansijske koji će, imajući u vidu zaključene ugovore, sigurno biti još bolji, već i položaj na tržištu i stečeno povjerenje investitora i partnera. Osim toga, vrsta usluga koje nudimo na islandskom tržištu je ove godine proširena. Ako poredimo prošlu i ovu godinu, Elnos Grupa je od izvođača jednog projekta i jedne vrste posla prerasla

u aktivnog i ozbiljnog učesnika na tržištu, sa znatno širom paletom usluga i mogućnosti. Tendencija rasta u narednim godinama je izvjesna.“

Upoređujući način poslovanja u regionu i na Islandu, Majstorović ističe da je sličan u oblasti ugovaranja, tehničkih standarda i načina izvršenja projekata. „Mislim da biznis možemo gledati globalno i da su određeni standardi rada postali zaista univerzalni i da se ostatak svijeta ne razlikuje mnogo od našeg regiona. Međutim, možemo reći da sve nordijske zemlje predstavljaju poseban standard ne samo rada, već i življenja i shvatanja života. To se ogleda i u načinu poslovanja sa izrazitom profesionalnošću i preciznošću. Istakao bih možda kao najbitniju razliku izraženu jednostavnošću i funkcionalnošću koja je karakteristična za Island kao tržište“, zaključuje on.

Pored brojnih specifičnosti i atrakcija, Island je i u oblasti energetike jedinstven. Naime, jedina je zemlja na svijetu koja koristi 100 odsto obnovljive izvore za proizvodnju električne energije. Velika je satisfakcija Elnos Grupe što ostavlja svoj pečat na ovakvom tržištu. Za nas raditi elektroenergetske projekte na Islandu ne predstavlja samo izazov, već i privilegiju. Način na koji se Islandani ophode prema energiji i pri-



„Rezultati definitivno bolji od očekivanih, pri čemu ne posmatram samo finansijske koji će, imajući u vidu zaključene ugovore, sigurno biti još bolji, već i položaj na tržištu i stečeno povjerenje investitora i partnera.“

Milenko Majstorović, direktor Elnos Iceland-a

rodi je poseban. To je spoj korisnog i ekološkog. Ponosni smo na ljude u Elnos Grupi koji su za kratko vrijeme uspjeli da se u potpunosti prilagode i odgovore ovakvim zahtjevima.

Predstavništvo u Reykjaviku, uz podršku na nivou Grupe, radi predano na jačanju pozicije na tržištu. Na Islandu u ovoj godini očekujemo realizaciju ugovorenih projekata i to nam je imperativ. Za sljedeću godinu očekujemo proširenje tima i rast Elnos Grupe u tom dijelu svijeta. Odluke o ovom donijeće Uprava grupacije na redovnom godišnjem zasjedanju nakon sagledavanja ostvarenih rezultata.

Priča o Elnos Iceland-u ne bi bila potpuna

bez utisaka o ovoj fascinantnoj zemlji. Majstorović je na Islandu boravio prilično dugo u više navrata, a ovo su mu najsnažniji utisci: „U pitanju je magična zemlja, gotovo nestvarna. Biti na Islandu znači probati čistu vodu i udisati čist vazduh, hodati po lavi, vidjeti gejzire, osjetiti miris vječnog leda. Na Islandu sam prvi put vidio zaista netaknutu prirodu koja je zahvaljujući izolovanosti Islanda i mudrosti Islandana takva kakva jeste. Poseban je osjećaj da ste u toj zemlji dobrodošli. Kao čovjek koji ima islandski matični broj, ne osjećam se kao turista, tako da o Islandu govorim sa velikom ljubavlju i poštovanjem.“

EN On Iceland, “the land of fire and ice”, Elnos Group opened another significant chapter at international level at the beginning of 2015. Our group was strengthened by another representative office, Elnos Iceland, with head office in distant Reykjavik. The first projects at 66. North parallel, in the Arctic Circle area, were marked in the map of our references.

Since establishment, our presence in this market is intensive one. As soon as we established the office, we had the first contract signed with Icelandic electrical power transmission company Landsnet. As early as in May 2015, preparations for work performance for the first project started. It was performed at the South i.e. central part of the country within deadline, professionally and in line with all professional standards.

Milenko Majstorović, the Director of the Elnos Iceland, says that: “Results are definitely better than expected. I am not talking only about financial results, which surely are going to be even better having in mind signed contracts. I am talking about position on the market and trust acquired from Investors and partners. Besides, type of service we offer on Icelandic market this year is expended. If we compare previous and this year, Elnos Group,



Crna plaža u selu Vik / The black beach in village Vik



Radnik Elnosa u opremi za maksimalnu sigurnost / Elnos worker in equipment for maximum safety



Pogled na rijeku Fossá / View of the river Fossá

which started as one project contractor, became active and serious participant on Iceland market with significantly broader palette of services and possibilities. Growth tendency in the upcoming years is evident.”

Comparing business operation mode in region and on Iceland, Majstorović notes that it is similar in contractual sense, technical standards and in the way of project performance. “I believe we could see business globally and certain work standards really became universal, so the rest of the world is not different from our region in a great measure. However, we could say that all Nordic countries represent special standard not only in work but in lifestyle and living ideas. This is reflected to work way with characteristic professionalism and accuracy. I could say the most important difference would be simplicity and functionality characteristic for Iceland as a market”, concludes Majstorović.

With many specific features and attractions, Iceland is a unique example in electric power field. Namely, Iceland is the only country in the world to use 100 per cent of renewable energy sources for production of electrical power. It is a great satisfaction for Elnos Group to leave its mark on such a market. It is not just a challenge for us to perform electrical power projects on

Iceland but it is a privilege, too. Way Icelanders treat energy and nature is a special one. It is a mixture of useful and ecologic way. We are proud of people in the Elnos Group who managed to adjust and respond to such requests in a short period.

Representative office in Reykjavik, supported at the Group level, works devotedly on strengthening its position on the market. As for this year, we expect realization of contracted projects on Iceland and it is our imperative. As for the next year, we expect to expand the team and growth of the Elnos Group in this part of the world. Decisions on this shall be made the Group Management at the regular annual meeting after analysis of the achieved results.

Story about Elnos Iceland would be incomplete without impressions of this fascinating country. Majstorović spent a lot of time on Iceland repeatedly, and these are the strongest ones: “We are talking about magic land, almost surreal. To be on Iceland, means to taste pure water and breathe clean air, walk in lava, see geysers, smell eternal ice. On Iceland, I got a chance to see untouched nature for the first time, which, thanks to Iceland’s isolation and wise Icelanders, is the way it is. It is a special feeling to be welcome in this country. Being a man with Icelandic personal identification number, I do not see myself as a tourist, so I speak about Iceland with a lot of love and respect.”

„Results are definitely better than expected. I am not talking only about financial results, which surely are going to be even better having in mind signed contracts. I am talking about position on the market and trust acquired from Investors and partners.“

Milenko Majstorović, the Director of the Elnos Iceland

Izbor najuspješnijih u privredi RS

Priznanje Elnosu BL

Selection of the most successful economy in RS
Recognition to Elnos BL

Na najznačajnijoj privrednoj svečanosti u Republici Srpskoj privrednim društvima dodijeljena priznanja u devet kategorija

On the economic most significant ceremony in Republic of Srpska the commercial companies have been assigned awards in nine categories



Branko Torbica prilikom uručenja priznanja / Branko Torbica at award presentation

SR U okviru 13. izbora najuspješnijih u privredi Republike Srpske za 2015, Elnosu BL je dodijeljeno posebno priznanje za 20 godina postojanja i uspješnog poslovanja. U ime naše kompanije priznanje je primio Branko Torbica, izvršni direktor Elnosa BL d.o.o. Banjaluka. Centralna manifestacija izbora najuspješnijih u privredi Republike Srpske održana je 30. marta 2016. u Kulturnom centru Banski dvor u Banjaluci, u organizaciji Privredne komore RS.

Na najznačajnijoj privrednoj svečanosti u Republici Srpskoj privrednim društvima su dodijeljena priznanja u devet kategorija. Svečanosti su prisustvovali predstavnici Vlade RS, predstavnici diplomatskog kora i privrednih komora iz regiona i šire, kao i brojni privrednici. U uvodnom obraćanju, predsjednik

Privredne komore Republike Srpske Borko Đurić rekao je da je, uprkos kriznoj prethodnoj godini, zabilježen privredni rast. On je dodao da zajednički cilj mora biti stvaranje stabilnog i razvijenog sistema i da raspoloživi resursi Republike Srpske govore da je to moguće.

EN Within the 13. The most successful economy elections in the Republic of Srpska for 2015, Elnos BL was granted a special award for 20 years of successful business. On behalf of our company award received Branko Torbica, Executive director of Elnos BL d.o.o. Banja Luka. The central event of the selection of the most successful in the economy of the Republic of Srpska was held on March 30 2016, at the Cultural Center Banski Dvor in Banja Luka,

organized by the Chamber of Commerce of RS.

On the economic most significant ceremony in Republic of Srpska the commercial companies have been assigned awards in nine categories. The ceremony was attended by representatives of the Government, representatives of the diplomatic corps and chambers of commerce from the region and beyond, as well as numerous businesses. In his opening remarks, the President of the Chamber of Commerce of the Republic of Srpska Borko Đurić said that despite the crisis the previous year, it has been recorded economic growth. He added that the common goal must be to create a stable and developed system, and that the available resources of the Republic of Srpska showing that are possible.

Dušan Torbica

Najbolji privrednik u regionu

Best businessman in the Region



Predsjednik naše kompanije dobio je priznanje za doprinos razvoju preduzetničkog i društvenog stvaralaštva na području regije Banjaluka, Republike Srpske i BiH

President of our company was awarded for contribution to development of entrepreneurship and social creative in the regions of Banja Luka, Republic of Srpska and BiH



Dušan Torbica prilikom uručenja nagrade / Dušan Torbica at award presentation

SR Prestižno priznanje „Najbolji privrednik u regionu“, predsjedniku Elnos Grupe Dušanu Torbici dodijeljeno je 20. juna 2016. u Banjaluci. Riječ je o uglednom priznanju „Kapetan Miša Anastasijević“, koje su na svečanoj dodjeli ponijela 23 najuspješnija aktera privrednog, kulturnog, javnog i sportskog života.

Laureatima su nagrade uručili predstavnici Media invent-a iz Novog Sada i Univerziteta u Banjaluci, a dodijeljene su uz pomoć privrednih komora Srbije i Republike Srpske, i uz konsultacije sa Privrednom komorom regije Banjaluka. Priznanje „Kapetan Miša Anastasijević“, predsjednik naše kompanije dobio je za doprinos razvoju preduzetničkog i društvenog stvaralaštva na području regije Banjaluka, Republike Srpske i BiH. Kriterijumi za dodjelu priznanja u ovoj kategoriji su: poslovnost, tržišna pozicija, konkurentnost,

održivi razvoj, društvena i korporativna odgovornost, moralne i etičke vrijednosti. „Drago mi je da se prate, cijene i objavljuju ostvareni rezultati, jer smo mi u Elnos Grupi zaista posvećeni uspješnom poslovanju. Ova nagrada je za mene obaveza i podsticaj da nastavim svoj rad sa još većom energijom“, ovom prilikom izjavio je Dušan Torbica.

EN Prestigious award “Best Businessman in the Region” was awarded to Dušan Torbica, the President of the Elnos Group on June 20, 2016 in Banja Luka. This is a prestigious award “Captain Miša Anastasijević”, which was awarded at the ceremony to 23 most successful people of economic, cultural, public and sport life.

Representatives of “Media invent” from Novi Sad and University of Banja Luka awarded laureates. Awards were supported by

Chambers of Commerce from Serbia and Republic of Srpska and in consideration with the Chamber of Commerce of Banja Luka Region. President of our company was awarded “Captain Miša Anastasijević” for contribution to development of entrepreneurship and social creative legacy in the regions of Banja Luka, Republic of Srpska and BiH. Criteria for award in this category are as follows: professionalism, market position, competence, sustainable development, social and corporate responsibility, moral and ethical values. “I am glad to see that achieved results are observed, appreciated and published since we, people in Elnos Group, are really devoted to successful business operation. This award is an obligation to me as well as a drive to continue my work with even more energy”, said Dušan Torbica on this ceremony.

NOVI PROJEKTI

ELNOS GRUPE

New projects of Elnos Group

SR

- > Potpuna rekonstrukcija TS 110/35/10 kV Bileća, ugradnja opreme i građevinski radovi
- > Izgradnja nove TS 110/20 kV Gradiška 2 sa izgradnjom DV 110 kV ulaz-izlaz
- > Kompletiranje DV polja Ugljevik i zamjena opreme u TS 110/x kV Lopare
- > Izrada projektne dokumentacije, nabavka i ugradnja vakuumskih prekidača u Rafineriji nafte u Brodu
- > Izgradnja 35 kV dalekovoda od MHE Medna do Čađavice
- > Rekonstrukcija 110 i 35 kV dalekovoda duž obilaznice oko Brčkog
- > Sanacija dalekovoda DV 110 kV Šamac-Odžak i DV 110 kV Odžak-Modriča
- > Elektro radovi na odvodnjavanju koncentrata magnetnog separatora Slon 2.500 u Rudniku Omarska, Arcelor Mittal

EN

- > Complete reconstruction of SS 110/35/10 kV Bileća, installation of equipment and construction works
- > Construction of new SS 110/20 kV Gradiška 2, with construction of TL 110 kV entrance-exit
- > Completion of TL Ugljevik bay and replacement of equipment in SS 110/x kV Lopare
- > Making projects documentation, purchase and installation of vacuum switchers in the Oil refinery in Brod
- > Construction of 35 kV transmission line from MHPP Medna to Čađavica
- > Reconstruction of 110 and 35 kV transmission line along bypass road around Brčko
- > Rehabilitation of transmission lines TL 110 kV Šamac-Odžak and TL 110 kV Odžak-Modriča
- > Electrical works in drainage of concentrated magnetic separator Slon 2.500 in Omarska Mine, Arcelor Mittal

BOSNA I HERCEGOVINA

Bosnia and Herzegovina



SRBIJA

Serbia



SR

- > Rekonstrukcija DV 110 kV Sremčica-Kolubara
- > Nova TS 110/20 kV Krnješevci, izrada tehničke dokumentacije i izgradnja po sistemu 'ključ u ruke'

EN

- > Reconstruction of transmission line 110 kV Sremčica-Kolubara
- > New SS 110/20 kV Krnješevci, making of technical documentation and construction per "turn-key" principle



CRNA GORA

Montenegro



SR

- > Rekonstrukcija TS 130/10 kV Kramforš ugradnja opreme i građevinski projekti
- > Rekonstrukcija ulaza DV 200 kV u TS Håtuna i demontaža DV 220 kV KL 12
- > Zamjena zaštitnog užeta i OPGW-a na DV 400 kV Storfinnforsen–Djurmo

SR

- > Rekonstrukcija TS 110/35 kV Nikšić, trafo polja T1 i T2

EN

- > Reconstruction of SS 110/35 kV Nikšić, transformer bay T1 and T2

ŠVEDSKA

Sweden

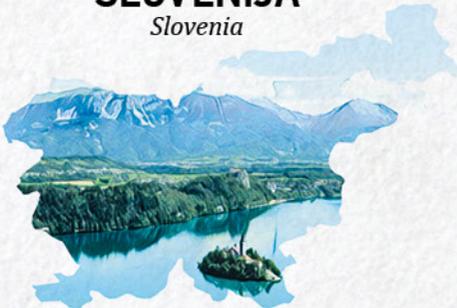


EN

- > Reconstruction of SS 130/10 kV Kramfors installation of equipment and construction projects
- > Reconstruction of entrance of TL 200 kV in SS Håtuna and disassembly of TL 220 kV KL 12
- > Replacement of protective rope and OPGW of TL 400 kV Storfinnforsen–Djurmo

SLOVENIJA

Slovenia



SR

- > Izgradnja novog DV 2x110 kV TS Bršljin-TS Gotna vas

EN

- > Construction of new TL 2x110 kV SS Bršljin–SS Gotna vas

ISLAND

Iceland

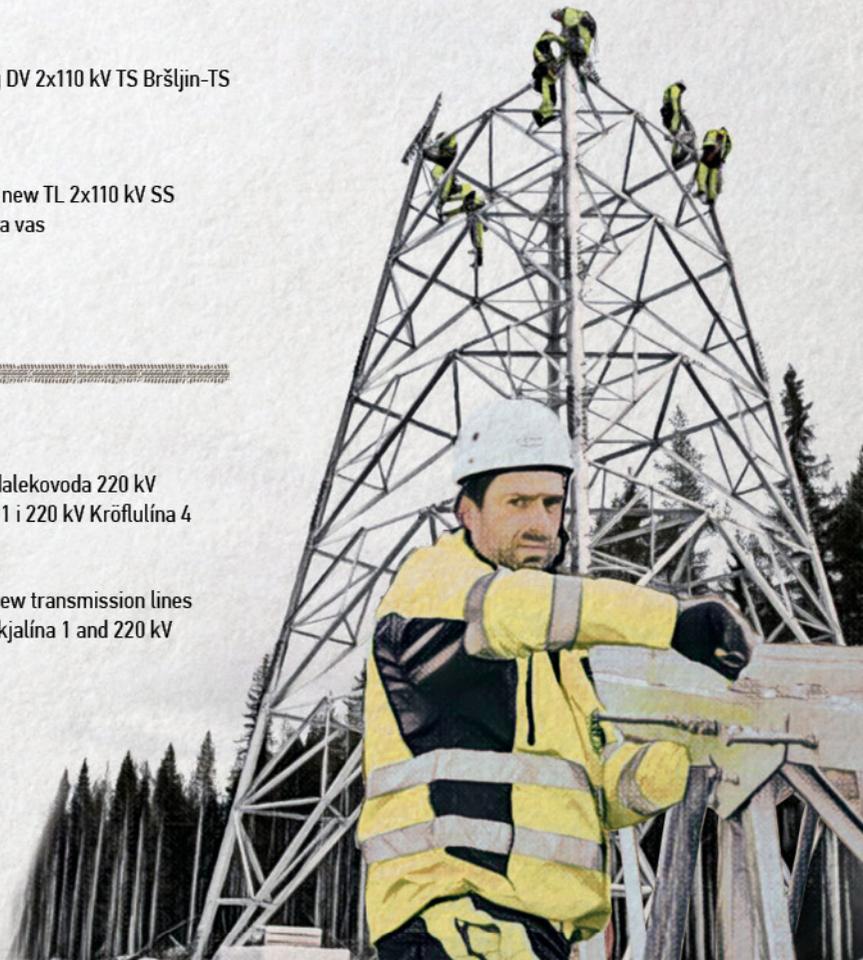


SR

- > Izgradnja novih dalekovoda 220 kV Peistareykjalína 1 i 220 kV Kröflulína 4

EN

- > Construction of new transmission lines 220 kV Peistareykjalína 1 and 220 kV Kröflulína 4



PROJEKAT KAPITALNOG ZNAČAJA

Major projects

Revitalizacija HE Zvornik podrazumijeva kompletnu zamjenu četiri turbinska agregata i rasklopnog postrojenja 110 kV. Elnos Grupa na čelu brojne domaće operative

Revitalization of HPP Zvornik includes complete replacement of four turbine generators and 110 kV switchyard. Elnos Group leading numerous national contractors

SR Iako hidroenergija učestvuje sa 30 odsto u ukupnoj proizvodnji električne energije u Srbiji, njen veliki potencijal nije dovoljno iskorišten. Jedan od kapitalnih projekata koji će djelimično popraviti ovu statistiku jeste projekat revitalizacije Hidroelektrane Zvornik. Ovaj „prvenac na Drini“, već 60 godina proizvodi energiju snagom od 96 MW, a nakon revitalizacije snaga hidroelektrane će se povećati na 124 MW.

Revitalizacija HE Zvornik podrazumijeva kompletnu zamjenu četiri turbinska agregata i rasklopnog postrojenja 110 kV. Investitor je Elektroprireda Srbije, glavni izvođač radova Voith Hydro, a Elnos Grupa je na čelu brojne domaće operative angažovane na ovom projektu.

Ovaj opsežni i kompleksni projekat ogroman je profesionalni izazov za nas. Sa Voith-om i sa svim partnerima na projektu, radićemo prvi put realizaciju cijelog projekta revitalizacije hidroelektrane, od početka – donjeg cjevovoda, do turbine – generatora. Bićemo jedan od izvođača sa najviše uvida u izvođenje radova na cijelom projektu, od mašinskih, građevinskih, montažnih radova, do ogromnog iskustva koje već stičemo kod prijema oprema u fabrikama.

Nakon revitalizacije HE Zvornik će biti nova hidroelektrana što se tiče elektromašinske

opreme, a zbog povećanja kapaciteta projekat obuhvata i dio građevinskih radova. Radovi na revitalizaciji počeli su 16. oktobra 2015. godine, trajaće četiri godine, za svaki agregat po godinu dana. Specifičnost u radu na ovom projektu je to da se radi na jednom agregatu, dok su ostala tri u radu. Mi smo uradili harmonizaciju i nostrifikaciju kompletnog projekta revitalizacije HE Zvornik, izradu jednog dijela i objedinjavanje kompletne projektne dokumentacije. Naša trenutna i dalja zaduženja u vezi su sa isporukom i puštanjem u rad zaštitno-upravljačkih uređaja, te isporukom i puštanjem u rad upravljačkog sistema elektrane. Pored toga, učestvujemo u izvođenju mašinskih, elektro i građevinskih radova, zajedno sa svojim podizvođačima.

Hidroelektrana je krajem maja bila poprište vrlo intenzivnih radova koji su se odvijali u tri smjene. Tada je uspješno završen jedan od najkompleksnijih poslova na revitalizaciji prvog agregata A1, prenošenje kompaktne montaže novog turbinskog agregata. Montaži novog agregata A1 prethodile su višemjesečne pripreme i radovi koji su obuhvatili: reparaciju opreme koja se zadržava, demontažu postojećeg turbinskog agregata, ispitivanje i isporuku nove opreme, pravljenje specijalne konstrukcije za potrebe

kompaktne montaže turbinskog agregata.

Povećan intenzitet radova pratila je i naša ekipa, a njihov rad ocijenio je direktor HE Zvornik Tomica Jovanović: „Poslovi koje izvodi Elnos Grupa su intenzivirani u posljednjih mjesec dana, a konkretni rezultati se vide. To je razvodno postrojenje 110 kV. Najzahtjevniji radovi su na postavljanju regala za novu opremu generatorskog napona. Veoma je kompleksno, jer se radilo na postavljanju regala za kablove i bušenje otvora za prolazak kablova i sabirnica u betonu debelom i po 3 m na nekim mjestima. Što se tiče investitora, veoma smo zadovoljni i dinamikom radova i profesionalnošću izvođenja radova Elnos Grupe“.

Za realizaciju ovakvog projekta izuzetno su važni profesionalnost i umijeće radnika. Naši projekat menadžeri ističu da se možemo ponositi svojim kadrom i da imamo urađene sve elaborate o zaštiti na radu. Napore koje svakodnevno činimo na sprovođenju ovih mjera prepoznali su i stranci, koji od nas traže savjete.

Revitalizacija HE Zvornik biće izvedena najnovijom, najmodernijom i veoma kvalitetnom opremom. Bitno je istaći da će i automatizacija kompletne HE biti izvedena najsavremenijom opremom koja se trenutno proizvodi kod nas i u svijetu. Po završetku projekta HE Zvornik će





Montaža vertikalne Kaplan turbine
Assembly of vertical Kaplan turbine



delivery and commission of protection and control devices, as well as delivery and commission of control system of the power plant. Apart from this, we take part in performance of mechanical, electrical and construction works, along with our subcontractors.

At the end of May, hydro power plant was center of intensive works going on in three shifts. At that time, one of the most complex revitalization projects on the first generator A1 was completed – transfer of compact network of new turbine generator. Assembly of the new generator A1 was preceded by preparations and works that lasted for several months and included the following: reparation of equipment being kept, disassembling the existing turbine generator, testing and delivery of new equipment, making special construction for needs of compact network of turbine generator.

Our team followed in increased works intensity and their work was described by Tomica Jovanović, Director of the HPP Zvornik: “Works performed by Elnos Group have been intensified in the past month and we have seen actual results. It is 110 kV distribution plant. The most demanding works include installation of cabinets for new equipment of generator voltage. It was very complex since those were cabinets for cables and drilling of openings for cables and bus bars in concrete thickness of as much as 3 m in some spots. As for the Investor, we are also very satisfied with time schedule and professionalism of work performance by Elnos Group”.

In order to realize such a project, employees’ professionalism and skills are extremely important. Our project managers note that we can be proud of our staff and that we have all the studies on protection at work ready. Efforts that we make every day in performance of these measures were also recognized by foreigners, who ask for a piece of advice from us.

Revitalization of HPP Zvornik is going to be performed by newest, most modern and high quality equipment. It is important to say that automation of entire HPP is going to be performed in the newest equipment currently produced nationally and throughout the world. After completion of the project, HPP Zvornik will be state-of-art hydro power plant in Serbia and region.

PROJECT BENEFITS

After revitalization, life operation of the hydro power plant will be extended for new 30 to 40 years. Ecological situation on the River Drina will be contributed. Total generator’s power will be increased and production of electrical power as well up to 15 per cent or for 70 million kWh a year. Practically, we get another generator through revitalization.

biti najsavremenija hidroelektrana u Srbiji i u regionu.

BENEFITI PROJEKTA

Nakon revitalizacije produžiće se radni vijek hidroelektrani za novih 30 do 40 godina i doprinijeti unapređivanju ekološke situacije na rijeci Drini. Ukupna snaga agregata biće povećana, a samim time i proizvodnja električne energije do 15 odsto ili za 70 miliona kilovat časova godišnje. Praktično, revitalizacijom dobijamo jedan agregat više.

EN Although hydro power covers 30 per cent of total production of electrical power in Serbia, its large capacity has not been used enough. One of the major projects, which are partially going to improve this statistics, is revitalization project of the Hydro power plant Zvornik. This “pioneer on the Drina” has been producing electrical power with capacity of 96 MW for 60 years and after revitalization the power plant’s capacity is going to be increased to 124 MW.

Revitalization of the HPP Zvornik includes complete replacement of four turbine generators and 110 kV switchyard. Investor is company Elektroprivreda Srbije, Voith Hydro is the Main Con-

tractor and Elnos Group leads numerous national contractors engaged in this project.

This vast and complex project is a huge professional challenge for us. This is going to be the first time for us to work with Voith and all the partners on the entire project of revitalization of hydro power plant – from the beginning – lower pipeline, to turbine – generator. We are going to be one of the contractors with the highest level of insight in work performance of the entire project, from mechanical, construction and assembly works to enormous experience, which we have already acquired through reception of equipment in factories.

After revitalization, HPP Zvornik will be a new hydro power plant as for electrical-mechanical equipment, and due to increase of capacity, project also covers a part of construction works. Revitalization works started on October 16, 2015 and shall last for four year – for one year for each individual generator. Specific feature in this project is that we perform works on one generator, whereas other three are operational. We performed harmonization and validation of entire revitalization project of HPP Zvornik, making of one piece and joining all designing documents. Our current and further tasks in the reference to

NOVI ŽIVOT MINI- -HIDROELEKTRANA

New life for mini-hydro power plants



Revitalizacijom ćemo udahnuti novi život u osam elektrana koje su puštene u rad u periodu dužem od jednog vijeka

Revitalization will give a new life for eight electrical power plants that have been operating for more than one century



MHE Pod gradom u Užicu / MHPP Pod gradom in Užice

SR Pred Elnos Grupom je istorijski posao i poduhvat u Zapadnoj Srbiji. U pitanju je revitalizacija osam mini-hidroelektrana, od kojih je najstarija MHE Pod gradom u Užicu puštena u pogon davne 1900. godine. Vodeći smo član konzorcijuma formiranog sa kompanijom KÖSSLER GMBH & Co KG. Naš konzorcijum će obaviti poslove proizvodnje, ispitivanja, isporuke, ugradnje i puštanja u rad elektro-mašinske opreme.

HIDROELEKTRANE KOJE SE REVITALIZUJU

MHE RAŠKA-NOVI PAZAR, MHE VRELO-B. BAŠTA, MHE RADALJSKA BANJA -ZVORNIK, MHE SELJAŠNICA-PRIJEPOLJE, MHE KRATOVSKA REKA-PRIBOJ, MHE TURICA-UŽICE, MHE POD GRADOM-UŽICE, MHE MORAVICA-IVANJICA.

Revitalizacijom su obuhvaćene elektrane koje su početkom i tokom 20. vijeka bile pravi biseri i predvodnice elektrifikacije u Srbiji, i osvjedočeni primjeri najsavremenijih tehnoloških i industrijskih svjetskih tekovina. Neke od njih su u funkciji, neke u oronulom stanju, a neke su prestale da funkcionišu prije nekoliko godina. Dugo već njihovo stanje zahtijeva revitalizaciju.

Za revitalizaciju svakog objekta potrebno je kompleksno sagledavanje stanja i kompleksni radovi koji se moraju izvesti na tim objektima. A kada modernu, novu opremu morate prilagoditi gabaritima i dimenzijama objekata koji su urađeni prije više od 100 godina, onda je sve što radite veoma specifično. U timu Elnos Grupe je Mijodrag Čitaković, jedan od najvećih stručnjaka u oblasti hidroenergije na ovim prostorima. On je za naš časopis objasnio kompleksnost zadatka: „Elektrane i nji-

hovi priključci su na nepristupačnim mjestima. Pored starosti, objekti su bili opterećeni raznim kvarovima koji su nastajali zbog stare opreme, konfiguracije terena pristupnih kanala, cjevovoda i ostalog. Svaki objekat je specifičan na svoj način. Imate objekte koji imaju otvorene kanale, duge preko četiri kilometra, objekte koji imaju duge cjevovode preko par kilometara, zatim hidromehaničku opremu koja je veoma specifična i koja se proizvodila i radila prije 100 godina“.

U ovakvoj situaciji je neophodno dobro uraditi tehničku dokumentaciju i pripremiti se za takve objekte. Elnos Grupa se u i periodu davanja ponuda izdvojila jedinstvenom ponudom, koja se temeljila na turbinama i generatorima sa većim stepenom korisnog dejstva nego što su sada i sa potvrđama ispitivanja.

O realizaciji posla Čitaković ističe: „Uložićemo sve kako bismo pokazali spremnost

JEDNA OD NAJSTARIJIH HIDROELEKTRANA NA SVIJETU

MHE POD GRADOM SPADA U NAJSTARIJE OČUVANE HIDROELEKTRANE NA SVIJETU, KOJA JE OSPOSoblJENA DA I DANAS IZ SVOJIH MUZEJSKIH GENERATORA PROIZVODI ELEKTRIČNU ENERGIJU. NAKON REVITALIZACIJE, STARI OBJEKAT ĆE BITI PRETVOREN U MUZEJSKU POSTAVKU, A PORED ELEKTRANE ĆEMO DOGRADITI NOVI AGREGAT KOJI ĆE IMATI FUNKCIJU PROIZVODNJE ELEKTRIČNE ENERGIJE.

Elnos Grupe da se nosi sa izazovima na ovakvim objektima, da možemo da uradimo sve što je neophodno da tim objektima damo dušu, te da im damo tehničku opravdanost i tehnička rješenje koja će narednih 40-50 godina moći da daju energiju u energetski sistem. Realizacija projekta počela je u maju 2016, a ugovoreni rok je 52 nedjelje“. Zatim dodaje: „Danas je sve mnogo savremenije, elegantnije, mnogo jednostavnije i za rukovanje i za ugradnju, tako da ćemo neka postrojenja, opremu koja je nekada bila hit, 'poslati u penziju' i zamijeniti je novom opremom koja će biti kvalitetnija i koja će praktično opravdati ulaganja. Primijenit ćemo najsavremenija tehnička rješenja, opremu koja je kvalitetna, koja se neće kvariti u toku eksploatacije i koja će biti ekonomična“.

Biće veliki izazov u dimenzije objekata koji su izgrađeni prije 100 godina uklopiti nove mašine i nova postrojenja i povezati sve da funkcioniše besprijekorno. Praktično, potrebno je da tehnički pomirimo dva vijeka. „Jedna od najbitnijih stvari koja će biti urađena je automatizacija kompletnih postrojenja i mogućnost daljinskog upravljanja i rada ovih postrojenja bez posade. Tehnika će omogućiti da se vrši nadzor i kontrola ovih postrojenja sa jednog mjesta iz dispečerskog centra“, zaključuje Čitaković.

Rekonstrukcijom MHE na teritoriji Zapadne Srbije uvećaće se proizvodni kapaciteti elektrana, steći njihova pouzdanost u radu, smanjiti troškovi održavanja, popraviti elektroenergetska situacija i broj kWh dobijenih iz obnovljivih izvora energije.

EN Elnos Group is facing historical work and endeavor in the West Serbia. It is revitalization of eight mini-hydro power plants, and the oldest one, MHPP Pod gradom in Užice, was commissioned as far as in 1900.

We are the Leaders in joint venture established with the company KÖSSLER GMBH & Co KG. Our joint venture is going to deal with activities of production, tests, delivery, installation and commission of electrical-mechanical equipment.

Revitalization covers power plants that were real pearls and pioneers of electrification in Serbia in 20th century. Those were witness of examples for the most modern technological and industrial world tradition. Some of them are still operational, some are falling apart, and some stopped their work several years ago. Revitalization has been necessary for a long time now.

Revitalization of each facility requests complex situation review and complex works, which should be done on these facilities. And, when you need to adjust modern and new equipment to sizes and dimensions of the facilities built over 100 years ago then everything you do is very specific. In Elnos Group team, we have Mijodrag Čitaković, one of the best experts in the field of hydro power in this region. For our magazine, he explained complexity of the task: "Power plants and their connectors are located in inaccessible places. Apart from being old, facilities were burdened by various failures resulting from outdated equipment, access channels terrain configuration, pipelines etc. Each facility is specific in its own way. There are facilities with open channels, over four kilometers long; there are facilities that have long pipelines, over couple of kilometers; there is hydro-mechanical equipment that is very specific and that was produced and created more than 100 years ago".

In such a situation, it is necessary to make technical documentation well and to prepare ourselves for the facilities. In the tendering procedure, Elnos Group set aside due to unique offer, which was based on turbines and generators with higher degree of usage effect than now and test certificates.

Čitaković says the following on work performance: "We are going to invest everything in order to show readiness of the Elnos Group to face challenges of such facilities, so that we can do everything necessary for giving soul to these facilities. We are going to provide them with technical justification and solutions, which enable them to produce electrical power to the electrical power system for the upcoming 40-50 years. Project realization started in May 2016 and contracted deadline is 52 weeks". Then Čitaković adds: "Nowadays, everything is more modern, more elegant,

ONE OF THE OLDEST HYDRO POWER PLANTS IN THE WORLD

MHPP POD GRADOM FALLS INTO THE OLDEST PRESERVED HYDRO POWER PLANTS IN THE WORLD, WHICH IS ABLE TO PRODUCE ELECTRICAL POWER FROM ITS VINTAGE GENERATORS EVEN TODAY. AFTER REVITALIZATION, OLD FACILITY IS GOING TO BE TRANSFORMED INTO MUSEUM EXHIBITION AND A NEW GENERATOR IS GOING TO BE BUILT NEXT TO THE POWER PLANT. IT IS GOING TO PRODUCE ELECTRICAL POWER.

and much simpler for operation and installation, so that some plants, equipment that was a hit once, 'are going to be retired' and replaced by new equipment which is going to be of better quality and practical in justifying investments. We are going to apply the state-of-art technical solutions, equipment of better quality, which is not going to fail during exploitation and which is going to be economical."

A big challenge are also going to be to fit new mechanization and plants into dimensions of the facility built over 100 year ago, and connect them all together to work perfectly. Practically, it is necessary to put two centuries together in technical sense. "One of the most important things to be done is automation of entire plants and possibility of remote control and plant operation without crew. Technicians is going to enable monitoring and control over these plants from one of locations in dispatcher center", concludes Čitaković.

Reconstruction of MHPP in the territory of West Serbia will increase production capacities of the power plants, achieve their reliability in work, decrease maintenance costs, improve situation in electrical power system and number of kWh produced by renewable sources of energy.

HYDRO POWER PLANTS BEING REVITALIZED

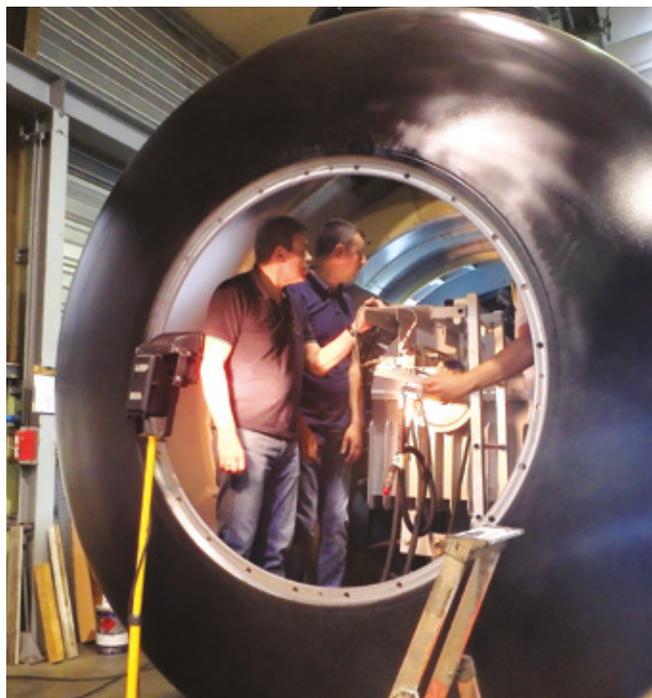
MHPP RAŠKA-NOVI PAZAR, MHPP VRELO-B. BAŠTA, MHPP RADALJSKA BANJA - ZVORNIK, MHPP SELJAŠNICA-PRIJEPOLJE, MHPP KRATOVSKA REKA-PRIBOJ, MHPP TURICA-UŽICE, MHPP POD GRADOM-UŽICE, MHPP MORAVICA-IVANJICA.

Najmodernija specifična tehnička rješenja

State-of-art specific technical solutions

Posebna tehnička specifičnost MHE Bočac 2 jeste izvedba turbinskog agregata koji će u potpunosti biti potopljen u vodi. U ovom periodu akcenat učesnika elektromašinske faze projekta usmjeren je na turbinske agregate

Special technical feature of MHPP Bočac 2 is installation of turbine generator, which is going to be immersed in water completely. In this period, turbine generators are target of the participants in the electrical-mechanical phase of the project



Kontrola fabričkih ispitivanja kapsule turbinskih agregata
Control of factory tests for turbine generator bulbs



SR Jedan od najzahtjevnijih i najatraktivnijih projekata u kojima učestvuje Elnos Grupa jeste izgradnja nove male hidroelektrane Bočac 2. Ovaj objekat specifičnih tehničkih rješenja gradi se na kompenzacionom bazenu Hidroelektrane Bočac, na kome je proširena postojeća brana. Instalirana snaga MHE Bočac 2 iznosiće 8,76 MW sa očekivanom godišnjom proizvodnjom od 41,6 GWh.

Posebna tehnička specifičnost MHE Bočac 2 jeste izvedba turbinskog agregata koji će u potpunosti biti potopljen u vodi. Specifična će biti i montaža hidromašinske opreme na koti koja je 21 m ispod kote puta i pristupnog platoa. U ovom periodu akcenat učesnika elektromašinske

faze projekta, tj. investitora i nadzornog tima, usmjeren je na turbinske agregate. Razlog za to je fabrički prijem turbinskih agregata koji je 7. i 8. jula 2016. obavljen u proizvodnom pogonu kompanije Andritz Hydro S.A.S. Jedan od vodećih svjetskih proizvođača hidromehaničke opreme proizveo je dva turbinska agregata snage po 5 MVA (kapsule sa generatorom i turbinskim radnim kolom) predviđena za ugradnju na MHE Bočac 2.

Proizvodnom procesu prethodio je višemjesečni iscrpan i izazovan proces rada Elnos Grupe. Ovaj proces je obuhvatao pregled i potvrde projektne dokumentacije, kompletiranje dokumentacije za ugradnju opreme i usklađivanje proiz-

vodača pojedinih komponenti elektromašinske i hidromehaničke opreme. Nakon toga uslijedila je faza proizvodnje opreme, praćena neophodnim kontrolama kvaliteta proizvedene opreme i njenim postepenim isporukama na gradilište.

Predmet fabričkog prijema u Francuskoj bio je pregled dokumentacije kontrole kvaliteta proizvoda i ponavljanje karakterističnih tačaka ispitivanja proizvedene opreme, u cilju potvrđivanja kvaliteta.

Nakon uspješnog fabričkog prijema opreme, slijedi kompletiranje dokumentacije kontrole kvaliteta i dokumentacije izvedenog stanja, te pakovanje i transport opreme na gradilište. Dogovoreni rok za prijem ove opreme na

gradilištu je kraj jula 2016. Sljedeća faza naših radova, montaža elektromašinske i hidromehaničke opreme biće izuzetno zahtjevna i praćena detaljnim planiranjem pojedinih faza.

Ovo je prvi projekat izgradnje nove hidroelektrane, na kojem naša kompanija predvodi kompletnu elektromašinsku i hidromehaničku fazu. Projekat realizujemo kao glavni ugovarač u saradnji sa investitorom ZP Hidroelektrane na Vrbasu a. d. Mrkonjić Grad i našim konzorcijskim partnerom Andritz Hydro S.A.S. Ugovor za isporuku i ugradnju elektromašinske i hidromehaničke opreme za MHE Boćac 2, koji

RAZVOJNI PROJEKAT VIŠESTRUKOG ZNAČAJA

IZGRADNJA MHE BOĆAC 2 JE RAZVOJNI PROJEKAT VIŠESTRUKOG ZNAČAJA ZA SISTEM ELEKTROPRIVREDE RS I PRIVREDU MRKONJIĆ GRADA. U ZAPADNOM DIJELU RS TROŠI SE OKO 50 Odsto, A PROIZVODI SE SVEGA PET Odsto ELEKTRIČNE ENERGIJE NA NIVOU ELEKTROPRIVREDE RS. IZGRADNjom MHE BOĆAC 2 PROMIJENIĆE SE OVAJ ODNOS I STVORITI USLOVI ZA STABILNIJE NAPAJanJE ELEKTRIČNOM ENERGIJOM U OVOM DIJELU SRPSKE.

Special technical feature of MHPP Boćac 2 is installation of turbine generator, which is going to be immersed in water completely. Assembly of hydro-mechanical equipment is also going to be specific at the point which is 21 m under the point of road and access plateau. In this period, turbine generators are target of the participants in the electrical-mechanical phase of the project, i.e. Investor and supervisory team. This is due to factory approval of turbine generators that was performed on July 7 and 8, 2016 in the production plant of the company Andritz Hydro S.A.S. One of the leading world producers of hydro-mechanical equipment produced two turbine generators of 5 MVA power (generator bulbs and turbine runners) planned for installation in MHPP Boćac 2.

Production process was preceded by Elnos Group's detailed and challenging working process for several months. This process included control and certification of project documentation, completion of documentation for equipment installation and harmonization of producers for certain components of electrical-mechanical and hydro-mechanical equipment. Afterwards, phase of equipment production was ongoing followed by necessary quality controls of produced equipment and its gradual delivery to the construction site.

In the aim of quality certification, review of quality control documentation for products and repeating characteristic testing features of produced equipment was subject to factory approval in France. Completion of quality control documentation and as-built documentation, as well as packing and transport of the equipment to the construction site follow successful factory approval of the equipment. Agreed deadline for acceptance of this equipment at the construction site is the end of July 2016. The next phase of our works, assembly of electrical-mechanical and hydro-mechanical equipment is going to be extremely demanding and followed by detailed planning of certain phases.

This is the first project of constructing new hydro power plant where our company leads all electrical-mechanical and hydro-mechanical phase. We perform the project as the Main Contractor cooperating with ZP Hidroelektrane na Vrbasu a. d. Mrkonjić Grad (Vrbas Hydro Power Plants) the Investor, and Andritz Hydro S.A.S., our consortium partner. Contract for delivery and installation of electrical-mechanical and hydro-mechanical equipment for the MHPP Boćac 2, which was signed in 2015, included making production project documentation for construction, delivery and assembly of the equipment, functional testing commission.



Učesnici realizacije projekta tokom fabričkih ispitivanja turbinskih agregata
Participants of project realization during factory tests of turbine generators

smo potpisali 2015. godine, obuhvata izradu proizvodne tehničke dokumentacije, isporuku i montažu opreme i funkcionalno ispitivanje i puštanje elektrane u rad.

EN One of the most demanding and the most attractive projects Elnos Groups takes part in is construction of new mini Hydro Power Plant Boćac 2. This facility of specific technical solutions is being built on balancing reservoir of the Hydro Power Plant Boćac, where the existing dam was expanded. Installed power of MHPP Boćac 2 is going to amount to 8.76 MW with expected annual production amounting to 41.6 GWh.

DEVELOPING PROJECT OF MULTIPLE IMPORTANCE

CONSTRUCTION OF THE MHPP BOĆAC 2 IS DEVELOPING PROJECT OF MULTIPLE IMPORTANCE FOR ELEKTROPRIVREDA RS AND ECONOMY IN MRKONJIĆ GRAD. ABOUT 50% OF ELECTRICAL POWER IS SPENT IN THE WEST PART OF THE REPUBLIC OF SRPSKA, AND ONLY FIVE PER CENT OF ELECTRICAL POWER IS PRODUCED ON THE LEVEL OF ELEKTROPRIVREDA RS. CONSTRUCTION OF THE MHPP BOĆAC 2 IS GOING TO CHANGE THIS RATIO AND CREATE CONDITIONS FOR MORE STABLE SUPPLY OF ELECTRICAL POWER IN THIS PART OF THE REPUBLIC OF SRPSKA.

Nove količine električne energije iz obnovljivih izvora

New amounts of electrical power from renewable sources



MHE Zapeće / MHPP Zapeće



Mini-hidroelektrana Zapeće je važna za Republiku Srpsku, jer povećava njenu energetska sposobnost

Mini hydro power plant Zapeće is important for the Republic of Srpska since it increases its electrical power capacity

SR Krajem avgusta 2015. godine svečano je puštena u rad mini-hidroelektrana Zapeće, koja se nalazi na rijeci Ugar na području opštine Kneževo. Izgradnju ove hidrocentrale realizovala je građevinska operativa iz Republike Srpske, bilo je angažovano više od stotinu radnika, a jedan od izvođača bila je i Elnos Grupa. "Ova mini-hidroelektrana je važna za Republiku Srpsku, jer povećava njenu energetska sposobnost zbog proizvodnje nove količine električne energije iz obnovljivih izvora. Za

RS je izuzetno bitno da nastavimo graditi ovakve objekte, kako bi sektor energetike nametnuli kao generator razvoja", ocijenio je ministar industrije, energetike i rudarstva u Vladi RS Petar Đokić.

Mini-hidroelektrana Zapeće je protočna hidroelektrana bez akumulacije, a predviđen je automatski rad elektrane, bez posade, sa daljinskim upravljanjem. Njena instalirana snaga je 3,4 MW, a planiranom godišnjom proizvodnjom obezbijediće dovoljnu količinu električne energije za snabdijevanje 5.200 domaćinstava. Ukupna vrijednost investicije iznosi 14 miliona evra.

Prema ugovoru sa investitorom EHE Banjaluka i našim partnerom ABB Zagreb, Elnos Grupa je bila zadužena za izvođenje kompletnih elektroinstalacionih radova i radova na montaži elektroenergetske opreme.

Nakon usaglašavanja dinamičkog plana sa izvođačima građevinske i mašinske faze, u periodu od dva i po mjeseca, završena je

montaža elektroinstalacija, sredjenaponskog postrojenja, ormara sopstvene potrošnje, step-up transformatora, upravljačko-zastitnih ormara, neophodnog razvoda komandno-signalnih i energetska NN i SN kablova, te montaža mjerne opreme na vodozahvatu.

Radove smo izvodili u periodu od februara do maja 2015, kada je izvršeno prvo probno priključenje, odnosno sinhronizacija elektrane na mrežu.

EN In late August 2015, Mini hydro power plant Zapeće was officially commissioned. It is located on the River Ugar in Kneževo Municipality. Construction of this hydro power plant was performed by construction division from the Republic of Srpska. More than a hundred of workers were engaged and one of the Contractors was Elnos Group.

"This Mini hydro power plant is important for the Republic of Srpska since it increases its electrical power capacity due to production

VISOKI EKOLOŠKI STANDARDI

DA SU PRILIKOM IZGRADNJE MHE ZAPEĆE KORIŠTENI VISOKI EKOLOŠKI STANDARDI, DOKAZ JE I IZGRADNJA RIBLJE STAZE, JEDINSTVENE NA OVIM PROSTORIMA, KOJA MOŽE POSLUŽITI KAO DOBAR PRIMJER ZA USPOSTAVLJANJE STANDARDA IZGRADNJE MINI-HIDROELEKTRANA U BIH.

of new amount of the electrical power from renewable sources. It is extremely important for the RS to carry on constructing such facilities in order to impose the electrical power sector as development generator", said Petar Đokić, Minister of industry, electrical power and mining in the RS Government.

Mini hydro power plant Zapeće is flow hydro power plant without accumulation and automatic operation of the plant, without crew, with remote controller, is planned. Its installed power is 3.4 MW, and planned annual production shall provide enough electrical power to power 5,200 households. Total investment amounts to € 14 million.

In line with the contract with EHE Banjaluka, the Investor, and our partner ABB Zagreb, Elnos

Group was in charge of performance of entire electrical installation works and works of assembling electrical power equipment.

After adjusting time schedule with contractor of construction and mechanical stage, in the period of two months and fifteen days, we completed installation of electrical installations, medium voltage plant, cabinets of local consumption, step-up transformers, cabinets for protection and control, necessary distribution of control, signal and power LV and MV cables, as well as assembly of measuring equipment of water intake.

We performed works in period from February to May 2015, when the first probe connection, i.e. synchronization of the electrical power plant to the network, was performed.

HIGH ECOLOGICAL STANDARDS

CONSTRUCTION OF THE FISH STRIPE, WHICH IS UNIQUE IN THIS REGION, IS THE PROOF THAT HIGH ECOLOGICAL STANDARDS WERE APPLIED IN CONSTRUCTION OF THE MHPP ZAPEĆE. IT CAN SERVE AS A GOOD EXAMPLE FOR SETTING STANDARDS IN CONSTRUCTION OF THE MINI-HYDRO POWER PLANTS IN BIH.

MHE Govza – projekat energetske budućnosti

MHPP Govza – project of power future

Kompanija Elnos BL Banjaluka je ponosna što je karika u lancu izgradnje mini-hidroelektrane Govza u Miljevini kod Foče, koja će u perspektivi proizvoditi oko 22 miliona kilovat časova električne energije

Company Elnos BL Banjaluka is proud to be a link in the chain of building mini-hydro power plant Govza in Miljevina in the vicinity of Foča, which is planned to produce about 22 million kWh of electric power

SR Zvanični podaci jasno kažu da ukupan tehnički iskoristiv potencijal vodotoka Republike Srpske iznosi 13.505 GWh godišnje, a ta ista proračunska statistika potvrđuje da je samo oko 30 odsto tog potencijala iskorišteno. Upravo ovakav podatak je već odavno nametnuo logičan zaključak da je jedan od najvećih potenci-



jala naših prostora, u okviru trenda postizanja što većeg stepena iskorištenja obnovljivih izvora energije, u projektima izgradnje malih hidroelektrana.

Prateći najnovije međunarodne standarde i trendove iz oblasti obnovljive energije, Elnos BL Banjaluka, kao jedna od vodećih kompanija u oblasti elektroenergetike u Republici Srpskoj, ponosna je što je karika u lancu jednog od ovakvih projekata, poduhvata izgradnje mini-hidroelektrane Govza, u mjestu Miljevina kod Foče.

U okviru ovog posla angažovani smo kao podizvođač firme ATB Server, koja je naš dugogodišnji partner i jedan od najstarijih proizvođača rotacionih električnih strojeva u jugoistočnoj Evropi, a naše zaduženje kao podizvođača je obavljanje posla ugradnje, ispitivanja i puštanja u rad elektroenergetske opreme.

Naime, MHE Govza ima dva agregata snage 4.365 kVA i 1.673 kVA. Posao Elnosa BL je obuhvatio montažu 6 kV generatorskog postrojenja, zatim 35/6 kV Step Up transformatora, 35 kV srednjenaponskog postrojenja, zaštitno-upravljačkih ormara, AC i DC sistema sopstvene potrošnje, neophodne upravljačke opreme na vodozahvatu elektrane, te kompletne energetske i komandno-signalne veze u krugu elektrane.

Poduhvat poput ovog sa sobom uvijek nosi dozu izazova, jer nije nimalo lak zadatak uskladiti dinamiku isporuke, ugradnje i testiranja opreme sa izvođačima mašinskih i građevinskih radova, sa ciljem da kompletan projekat izgradnje elektrane bude realizovan u što je moguće

kraćem periodu. Radovi na montaži elektroenergetske opreme su okončani u periodu od novembra 2015, zaključno sa aprilom ove godine.

Inače, mala elektrana na rijeci Govzi u Foči, koja je trenutno u fazi probnog rada, po okončanju projekta će godišnje proizvoditi oko 22 miliona kilovat časova električne energije, što je otprilike dovoljno za snabdijevanje više od 6.000 domaćinstava. Glavni investitor je firma Elektros iz Banjaluke, koja je u njenu izgradnju uložila između 12 i 13 miliona konvertibilnih maraka.

EN Official data clearly state that total technically usable capacity of water flows in the Republic of Srpska amounts to 13,505 GWh a year, and the same calculation statistics confirms that only about 30 per cent of this capacity has been used. This data is the reason that there is a logical conclusion existing for a while: one of the biggest capacities of our region, within the trend of achieving as high degree as possible in usage of renewable power sources, lies in building mini-hydro power plants projects.

Following in the newest international standards and trends in the field of renewable power, Elnos BL Banjaluka, being one of the leading companies the field of electrical power system in the Republic of Srpska, is proud to be a link in the chain of one of the projects of this kind, endeavor of building mini-hydro power plant Govza in Miljevina in the vicinity of Foča.

In the frame of this work, we have been hired as Subcontractor of the company ATB Server,

which has been our partner for many years and is one of the oldest producers of rotation electric devices in the South-East Europe. Our task, being the Subcontractor, is to perform installation, testing and commission of electrical power system equipment.

However, MHPP Govza has two generators: 4,365 kVA and 1,673 kVA. The work of Elnos BL included assembly of 6 kV generator plant, 35/6 kV Step Up transformer, 35 kV medium voltage plant, cabinets for protection and control, AC and DC system for local consumption, necessary controlling equipment at the water intake of the power plant, as well as entire electrical power system and controlling-signal connection within the power plant.

Endeavour like this always carries a kind of challenge since it is not easy at all to adjust dynamics of supply, installation and testing of the equipment with contractors for mechanical and construction works, in the aim that entire project of building the power plant is to be realized as soon as possible. Assembly works of electrical power system equipment ended in period from November 2015 April this year conclusive.

Namely, small power plant on the River Govza in Foča, which is in the probation work phase at the moment, shall produce about 22 million kWh of power after the project completes, which is about enough for supply of more than 6,000 homes. The lead Investor is the company Elektros from Banjaluka, which invested between 12 and 13 million Bosnian Marks in construction of this plant.



MHE Govza / MHPP Govza

Uspješna rekonstrukcija postrojenja

Successful reconstruction of the plant

**Realizacija dva projekta
rekonstrukcije razvodnih postrojenja
pozitivno će uticati na povećanje
tehničke efikasnosti i iskorišćenja
kapaciteta za proizvodnju električne
energije u Termoelektrani Kostolac**

*Realization of two projects of
reconstructing distribution plants
will have positive effect on increase of
technical efficiency and use of capacity
for production of electrical power in
Thermal Power Plant Kostolac*



TE Kostolac / TPP Kostolac

SR U jednoj od najznačajnijih termoelektrana u Elektroprivredi Srbije, Termoelektrani Kostolac, Elnos Grupa obavila je rekonstrukciju razvodnog postrojenja 110 kV. Ovo postrojenje nalazi se ispred same termoelektrane Kostolac A i predstavlja mjesto injektiranja energije dva termobloka od termoelektrane Kostolac A.

Naš zadatak je bio da demontiramo i zamijenimo kompletnu primarnu opremu, te zamijenimo staru mehaničku zaštitu novom, mikroprocesorskom. Projekat smo uspješno obavili, kao podizvođač Siemens-a Beograd, za investitora EPS, PD "Termoelektrane i kopovi Kostolac".

Projekat potpune rekonstrukcije tri 110 kV polja trajao je od početka jula do sredine septembra 2015. godine. Rekonstruisani su 110 kV dijelovi postrojenja transformatorskog polja 2T, DV 1159 Drmno i DV 1128/1 Rudnik I, čime je skoro u potpunosti revitalizovana 110 kV strana postrojenja.

Imali smo besprijeckornu saradnju sa investitorom, sva pitanja i nedoumice rješavali smo zajedno. Međutim, i ovaj posao je imao svoje specifičnosti, koje su uspješno riješene. Za ovo postrojenje je karakteristična vrlo nezgodna trasa kablova, duga preko 200 m. Kablovski kanali prolaze kroz zgradu elektrane, vrlo su uski i bili su prepuni starih kablova. Na ruku

nam nisu išli ni vremenski uslovi, zbog visokih temperatura, koje su prelazile 40 stepeni celzijusa.

Uporedo sa rekonstrukcijom 110 kV razvodnog postrojenja uradili smo i rekonstrukciju 35 kV polja transformatora 2T. U razvodnom postrojenju 35 kV takođe smo demontirali i zamijenili kompletnu primarnu opremu i staru mehaničku zaštitu zamijenili novom, mikroprocesorskom.

Realizacija ova dva projekta rekonstrukcije pozitivno će uticati na povećanje tehničke efikasnosti i iskorišćenja kapaciteta za proizvodnju električne energije u Termoelektrani Kostolac.

EN Elnos Group reconstructed 110 kV distribution plant in one of the most significant thermal power plants of Elektroprivreda Srbije, Thermal Power Plant Kostolac. This plant is located immediately in front of the Thermal Power Plant Kostolac A and represents a place of injecting of the energy from two thermal blocks from Thermal Power Plant Kostolac A.

We were to disassemble and replace entire primary equipment and replace old mechanical protection with new, microprocessor one. We realized the project successfully, being Subcontractor for Siemens Belgrade, for the Investor EPS, company "Thermal plants and cast mines".

Project of comprehensive reconstruction of three 110 kV bays lasted from the beginning of July to mid-September 2015. The following was reconstructed: 110 kV parts of transformer bay plant 2T, TL 1159 Drmno and TL 1128/1 Rudnik I, which almost completely revitalized 110 kV side of the plant.

Our cooperation with the Investor was impeccable. We solved all the problems and issues jointly. However, these works had their specific features, which were successfully solved. A very uninviting over 200 m long cable route is characteristic for this plant. Cable trenches go through power plant building. They are very narrow and were packed with old cables. We did not have weather conditions on our side as well due to high temperatures, which went over 40 centigrade Celsius.

Simultaneously with reconstruction of 110 kV distribution plant, we reconstructed 35 kV 2T transformer bay. In 35 kV distribution plant, we also disassembled and replaced entire primary equipment and replace old mechanical protection with new, microprocessor one.

Realization of two projects of reconstructing will have positive effect on increase of technical efficiency and use of capacity for production of electrical power in Thermal Power Plant Kostolac.

Naučnim pristupom riješeni praktični problemi

Scientific approach solves practical issues



Hidroelektrana Bočac / Hydro Power Plant Bočac



Elnos Grupa obezbijedila optimalno rješenje za uklanjanje opasnosti i minimalnu ugroženost elektroenergetskih postrojenja HE Bočac od atmosferskih prenapona

Elnos Group provided optimal solution for elimination of hazards and minimum vulnerability of electrical power plants of HPP Bočac from atmospheric surge

SR Tokom eksploatacije Hidroelektrane Bočac, u kratkom periodu desilo se nekoliko kvarova izolacije u 35 kV postrojenju, što je značajno ugrozilo pogonsku spremnost elektrane, sigurnost opreme i angažovanog osoblja. Menadžment Hidroelektrana na Vrbasu odlučio je da ove probleme koji mogu eskalirati razornim naponima riješi pokretanjem projekta „Izrada simulacione analize 35 kV mreže na HE Bočac i ugradnja odvodnika prenapona“. Ove vrlo specifične, zahtjevne i opasne analize, koje se rade veoma rijetko, povjerene su Elnos Grupi.

Realizacija projekta trajala je četiri mjeseca, od novembra 2015. do februara 2016. godine. Na ovom tehnički kompleksnom i zahtjevnom projektu ostvarili smo izuzetnu saradnju sa Milanom Savićem, profesorom Elektrotehničkog fakulteta u penziji. „Prilikom rada na ovom projektu pojavila su se dva tehnička problema u vezi sa koordinacijom srednjenaponskih dis-

tributivnih mreža: problem izbora i lokacije odvodnika prenapona u mrežama srednjih napona i problem intermitentnih prenapona u srednjenaponskim mrežama sa izolovanom neutralnom tačkom“, uvodi nas u srž projekta Savić.

Ovo je tehnički izuzetno interesantan projekat, jer je omogućio naučni pristup i metode za rješavanje praktičnih problema, te je spajanjem inženjerskog iskustva, teorije iz oblasti tehnike visokog napona i najmodernijih tehnoloških rješenja, proizvođača visokonaponske opreme obezbijedio optimalno rješenje za uklanjanje opasnosti i minimalnu ugroženost elektroenergetskih postrojenja HE Bočac od atmosferskih prenapona.

Tokom eksperimenta i ispitivanja korištena je ispitna oprema razvijena u laboratorijama elektroenergetskog odsjeka Elektrotehničkog fakulteta u Beogradu.

Studija atmosferskih prenapona vršena je primjenom kompjuterskih programa za koordinaciju izolacije pri revitalizaciji starih postrojenja, koji omogućavaju kvantitativnu procjenu rizika oštećenja izolacije zbog atmosferskih prenapona, što se izražava kao očekivani broj godina bez kvara izolacije.

Eksperimentalno je provjeren nivo parcijalnih pražnjenja indirektnom metodom, tj. korištenjem nestandardne metode osciloskopskog snimanja struje kroz zemljovod transformatora. Mjerenja su obavljena na dva suva transformatora kućne potrošnje 35/0.4 kV, od kojih se na jednom već dogodio kvar.

Savić zaključuje: „U Hidroelektrani Bočac je na osnovu numeričkih proračuna predložena dodatna prenaponska zaštita i izabrani su adekvatni odvodnici prenapona, kod kojih je rizik kvara opreme od atmosferskih prenapona smanjen od nedozvoljeno visokog nivoa, koji je postojao prije primjene ovih mjera, na nivo koji je prihvatljiv na osnovu odgovarajućih međunarodnih standarda.“

O sljedećoj fazi projekta on ističe: „Kada su u pitanju visokonaponske mreže, važno je izvršiti studiju koordinacije izolacije opreme u gasom izolovanom postrojenju i energetskih transformatora, jer se malim ulaganjem u prenaponsku zaštitu sprečavaju havarije sa teškim posljedicama.“

U 35 kV mreži HE Bočac izvršeni su eksperimenti na 35 kV mreži, pri čemu je rađena operacija simuliranja zemljospoja preko električnog luka na otvorenom prostoru ispred uvodnih izolatora od 35 kV vodova. Zemljospoj je generisan na zemlji spuštajući provodnik zakačen za jednu od faza prema iskrištu, pomoću koga se luk uspostavljao i rastezao. Prelazni napon je mjereno na fazi bez zemljospoja, pomoću djelila napona.

Eksperimentalna mjerenja su poređena računarskom simulacijom prenapona pri postojanju intermitentnog prenapona preko luka.

Posljednja faza projekta koju smo uradili bila je ugradnja odvodnika prenapona, u skladu sa sprovedenom studijom koordinacije izolacije, koji će obezbijediti efikasnu zaštitu 35 kV elektroenergetske mreže HE Bočac.

EN In exploitation of the Hydro Power Plant Bočac, in short period, there were several insulation failures in 35 kV plant, which significantly jeopardized operation readiness of the electrical power plant, safety of equipment and hired personnel. Management of the Vrbas Hydro Power Plants decided to solve these problems, which could escalate by devastating voltages, by starting the project titled

“Making simulation analyses of 35 kV network in the HPP Bočac and installation of surge arrestors”. These specific, demanding and dangerous analyses, which are seldom performed, are assigned to Elnos Group.

Project realization lasted for four months, from November 2015 to February 2016. This technically complex and demanding project provided us with exceptional cooperation with Milan Savić, a retired professor from the Electrical Engineering Faculty. “In this project performance, there were two technical problems referring to coordination of medium voltage distributive networks: problem of selecting and positioning surge arrestors in medium voltage networks and problem of intermittent surges in medium voltage networks with insulated neutral point”, Savić introduces us to the project essence.

This is a very interesting project in technical sense since it enabled a scientific approach and methods for dealing with practical problems. Joining engineering experiences, theory in high voltage field and state-of-art technological solutions, producers of high voltage equipment ensured optimal solution for elimination of hazards and minimal risk for electrical power plants of the HPP Bočac from atmospheric surges.

In experiments and tests, we used test equipment developed in laboratories of the electrical engineering department of the Electrical Engineering Faculty in Belgrade.

Study of atmospheric surges was performed by application of computer programs for coordination of insulation during revitalization of old plants. These provide quantitative estimation of risk from damaged insulation caused by atmospheric surges, which is expressed by expected number of years without insulation failure.

Experimentally, a level of partial discharges was tested by indirect method, i.e. by using non-standard method of oscilloscopic power recording through transformer earthing. Measurement were performed in two dry transformers of local consumption of 35/0.4 kV, and one of them already experienced failure.

Savić concludes: “Based on numeric calculations in the Hydro Power Plant Bočac, additional surge protection was proposed and adequate surge arrestors were selected. These have risk from equipment failure in atmospheric surges diminished from unacceptable level, which existed before application of these measures, to the acceptable level based on appropriate international standards.”

In the reference to the next project stage, Savić says: “When we talk about high voltage networks, it is important to do the study of coordination of equipment insulation in gas insulated plant and power transformers since small investments in surge protection prevent large scale disaster consequences.”

In 35 kV network of the HPP Bočac, we performed experiments on 35 kV network, where operation of simulating earth fault through electric arc outdoors in front of entrance insulators of 35 kV ducts. Earth fault was generated on the ground descending the duct attached to one of phases toward spark-gap, which helped arc establishment and extension. Transfer voltage was measured on the phase without the earth fault with voltage dividers.

Experimental measuring was compared through computer simulation of surge in presence of intermittent surge through the arc.

The last stage of the project we performed was installation of surge arrestors in line with the performed study of insulation coordination, which shall provide efficient protection of 35 kV electrical power network of the HPP Bočac.



Simuliranje zemljospoja na 35 kV mreži putem električnog luka / Earthing simulation at 35 kV network through electric arc

Obezbijedili smo rad generatora 1 u HE Bočac

We provided work of generator 1 in HPP Bočac



Foto / Photo: Mladenko Đaković

Panorama HE Bočac / Panorama of HPP Bočac



Elnos BL Banjaluka uspješno obavio poslove ugradnje rezervnih zaštita na generatoru 1 i zamjene elektromehaničkih zaštita u dalekovodnim poljima u hidroelektrani Bočac

Elnos BL Banjaluka successfully executed all the works of installing backup protections for the generator 1 and replacement of electrical-mechanic protections of transmission line fields in the Hydro Power Plant Bočac

SR Povećanje stepena pouzdanosti i sigurnosti rada generatora Hidroelektrane Bočac, koja je jedna od najznačajnijih karika elektroenergetskog sistema Republike Srpske u oblasti hidroenergije, jedan je od najbitnijih zadataka za menadžment ove hidroelektrane.

Činjenica da nam je preduzeće Hidroelektrane na Vrbasu kao investitor povjerilo jedan od najvažnijih poslova iz oblasti bezbjednog rada Hidroelektrane Bočac, koji podrazumijeva ugradnju rezervnih zaštita na generatoru 1 na toj hidroelektrani, za nas znači nastavak uspješnog niza referenci koje je naša kompanija dobila za rekonstrukcije i modernizacije najvažnijih elektroenergetskih objekata u Republici Srpskoj.

Projekat koji nam je povjeren je podrazumijevao nabavku i izgradnju sistema rezervnih generatorskih zaštita, a ovaj izazovan zahvat

implementacije kompleksne generatorske zaštite realizovali smo u saradnji sa kolegama iz partnerske firme Saturn Electric, te predstavnicima kompanije SEL, tako da smo u okviru njega ugradili generatorsku zaštitu tipa SEL 700G.

Podsjetimo da su u HE Bočac instalirana dva sinhrona generatora nominalne snage po 55 MW. Elektrana koristi 16,2 odsto hidropotencijala rijeke Vrbas i godišnje proizvodi oko 307,5 GWh.

Prilikom izvođenja radova u HE Bočac, poseban izazov je bio u tome da se posao na zaštiti generatora 1 obavi bez ugrožavanja rada glavne zaštitne opreme generatora i rada generatora 2, koji je tokom perioda izvođenja bio u režimima rada i pogonske spremnosti. Naši operativci su u tome i uspjeli, a svi radovi su okončani u ugovorom predviđenom roku, odnosno od početka aprila do kraja avgusta prošle godine.

Obiman posao zaštite generatora nije bio jedini posao koje nam je u godini iza nas povjeren u Hidroelektrani Bočac.

Naime, Elnos BL Banjaluka je u ovoj hidroelektrani uradio zamjenu postojećih elektromehaničkih zaštitnih uređaja u 110 kV dalekovodnim poljima savremenim mikroprocesorskim zaštitno-upravljačkim uređajima.

Tokom ovog projekta demontirana su postojeća četiri zaštitna ormara, te ugrađena četiri nova, samostojeća, opremljena neophodnim zaštitno-upravljačkim mikroprocesorskim uređajima. Pored zamjene zaštitno-upravljačke opreme, izvršili smo i polaganje novih komandno-signalnih i napojnih kablova, koji omogućuju vezu sa primarnim postrojenjem.

Paralelno sa projektom zamjene postojećih elektromehaničkih zaštitnih uređaja realizovali smo i uvezivanja podsistema elektrane na SCADA sistem, koji je integrisala ruska kompanija Tornado.

Kako bi bila omogućena komunikacija sa SCADA sistemom i aktiviranje jedinstvenog sistema za nadzor i upravljanje elektranom HE Bočac, Elnos je obavio i poslove parametrisanja i korigovanja konfiguracija pojedinih podsistema HE Bočac i to u vidu generatorske zaštite, zaštite blok transformatora, zaštite 35 kV postrojenja, sistema turbinske regulacije i, konačno, sistema hlađenja generatora i turbine.

EM Increasing reliability degree and work safety for the generator of the Hydro Power Plant Bočac, which is one of the most important links of electric power system of the Republic of Srpska in the field of hydro power, is one of the most significant tasks for the management of this hydro power plant.

The fact the Investor - company Hidroelektrane na Vrbasu (Vrbas Hydro Power Plants) entrusted us with one of the most important work in the field of work safety for the Hydro Power Plant Bočac, which understands installation of backup protections of the generator 1 in this hydro power plant, represents continuing of successful series of references our company got for reconstructions and modernization of the most important electrical power system facilities in the Republic of Srpska.

Projects entrusted to us included purchase and construction of the system for generator backup protection, and we performed this challenging work of implementing complex generator protection cooperating with colleagues from the partner company Saturn Electric, as well as representatives of the company SEL. In the frame of this project, we installed generator protection type SEL 700G.

Let us remind you that two synchronized generators of nominal power of 55 MW each were installed in the HPP Bočac. Electrical power plant uses 16.2 per cent of hydro capacity of the River Vrbas and produces about 307.5 GWh a year.

During work performance in the HPP Bočac, a special challenge was to perform the generator 1 protection activities without jeopardizing performance of the main protective equipment of the generator and generator 2, which was put to work regimes and operation stand-by during work performance. Our employees made it and all the works were performed in contracted deadline i.e. from the beginning of April to the end of August last year.

Voluminous work of generator protection was not the only task entrusted to us in the previous year in the Hydro Power Plant Bočac.

Namely, Elnos BL Banjaluka also replaced the existing electrical-mechanic protection devices of the 110 kV transmission line fields in this hydro power plant by modern microprocessor protection-controlling devices.

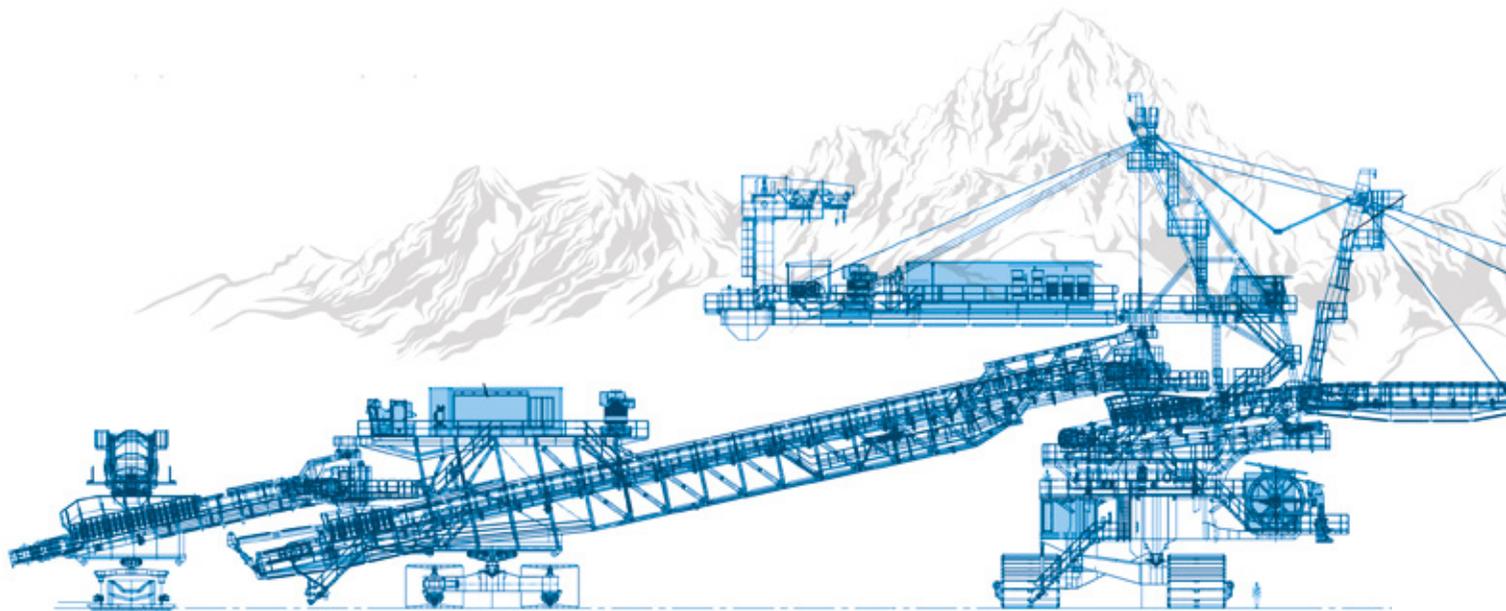
In this project, the existing four protection cabinets were disassembled and four new ones were installed, standalone, equipped by necessary protection-controlling microprocessor devices. Apart from replacing protection-controlling equipment, we also laid new control and signaling cables, and supply cables, providing connection with the primary plant.

Simultaneously with the project of replacing of the existing electrical-mechanic protection devices, we also performed connection of sub-system of the electric power plant to SCADA system, which had been integrated by Russian company Tornado.

In order to enable communication with SCADA system and activation of unique system for monitoring and controlling the Hydro Power Plant Bočac, Elnos performed parameterization and corrections to certain subsystems of the HPP Bočac in the form of generator protection, protection of block transformers, protection of 35 kV plant, system of turbine regulation and, finally, cooling system for generator and turbine.



Funkcionalno ispitivanje – zaštitno-upravljački ormari 110 kV DV polja
Functional test – cabinets for protection and control 110 kV TL bay



IZRADA PRAVOG DŽINA ODLAGAČ 12.000

Constructing real giant Spreader 12.000



Elnos Grupa s ponosom učestvuje u prvom 'zelenom' projektu u oblasti rudarstva u EPS-u. Izgradnja odlagača 12.000, mašine džina, odvijaće se na otvorenom prostoru i trajaće oko godinu dana

Elnos Group is proud to take part in the first 'green' project in the field of mining in the company EPS. Construction of spreader 12.000, giant machine, will be performed outdoor and will last for about a year

SR Poznato je da se u Srbiji nešto više od polovine ukupne proizvodnje električne energije dobija iz termoelektrana za koje je gorivo domaći ugalj. Zbog toga je za održavanje elektroenergetske stabilnosti srpske elektroprivrede izuzetno značajno otvaranje novih eksploatacionih polja i održavanje kontinuiteta proizvodnje uglja i otkrivke.

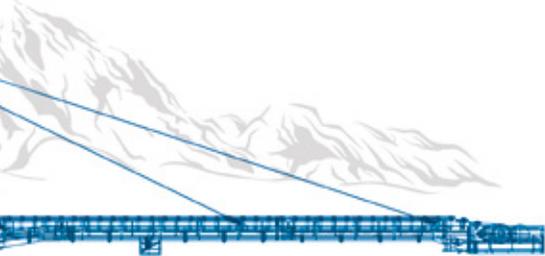
Elnos Grupa s ponosom učestvuje u velikom investicionom projektu „Unapređenje zaštite životne sredine u JP EPS i RB Kolubara“, prvom 'zelenom' projektu u oblasti rudarstva u EPS-u. Ovaj multidisciplinarni i veoma složeni projekat obuhvata projektovanje, izradu i montažu BTO (bager-traka-odlagač) sistema za budući površinski kop polje „C“. Vrijednost investicije sva tri paketa je 182 miliona evra, a naša kompanija učestvuje u realizaciji paketa B, u izradi odlagača.

Ovo je naš prvi posao u oblasti industrije za proizvodnju mašina za površinske kopove i zbog

toga nam je izuzetno značajan. Elnos Grupa je podizvođač austrijskog Sandvika, a naš zajednički ugovor obuhvata projektovanje, nabavku, isporuku, ugradnju elektro opreme i puštanje u rad odlagača 12.000.

Odlagač je mašina koja se nalazi na kraju sistema trakastih transportera i služi da materijal koji se dopremi na njega prihvati i omogući kontinuirano rasipanje materijala na predviđenom mjestu. Oznaka 12.000 predstavlja broj kubnih metara materijala koji mašina može da odloži za jedan čas rada, tako da spada u red većih mašina u kolubarskom basenu.

Ukupna instalirana snaga mašine je približno 5630 kW (dva uljna transformatora snage po 2500 kVA i dva suva transformatora snage po 315 kVA). Njeni najveći motori su za pokretanje traka, i to za istovarnu traku dva motora snage po 630 kW, za međutraku dva motora snage po 630 kW, za prijemnu traku jedan motor snage 630 kW. Ovi motori rade na naponu 690 V i fre-



kventno su regulisani. Motori pogonskih gusjenica su snage 110 kW, rade na naponu 690 V i takođe su frekventno regulisani.

Sva elektro oprema biće smještena u četiri kontejnera i dvije kabine za rukovaoca. Nadzorno-upravljački sistem realizovaće se sa naj-savremenijom opremom koja je namijenjena za ovu vrstu industrije. Mašina će biti opremljena 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.

Ugovoreni rok za realizaciju projekta je oktobar 2017. godine, a njegovom realizacijom otvara se put u oblast koja ima budućnost u Srbiji i okruženju. Izgradnja ove mašine džina, odvijaće se na otvorenom prostoru, tj. na montažnom placu rudarskog basena Kolubara i trajaće oko godinu dana. Ovo će dodatno otežati rad, jer će ekipa koja bude na ovom zadatku morati tu da provede sva četiri godišnja doba.

EN It is well-known fact that about more than half of total produced electrical power in Serbia comes from thermal power plants using domestic coal as fuel. Due to this, and in the aim of keeping electrical power stability of the Serbian electrical power economy, it is extremely important to open new exploitation fields and keeping continuity of production of coal and overburden.

Elnos Group is proud to take part in a big investment "Environmental improvement project" in PC EPS and Mining Basin Kolubara" - the first 'green' project in the field of mining in the company EPS. This multidisciplinary and very complex project includes designing, performance and assembly of the EBS (excavator-belt conveyor-spreader) system for the future open

cast mine for the field "C". Investment value for all three packages is € 182 million and our company takes part in realization of the Package B - construction of the spreader.

This is our first project in industry for production of mechanization for open cat mines and due to this it is extremely significant to us. Elnos Group is Subcontractor of the Austrian company Sandvik and our joint contract includes designing, purchase, delivery, installation of electrical equipment and commission of the spreader 12.000.

Spreader is a machine positioned at the end of the belt conveyor system. It serves for loading of the material brought to it and provides continuous spreading of material to the planned location. Mark 12.000 represents a number of cubic meters of material the machines is able to spread in one working hour, so it belongs to a class of bigger machines in the Kolubara basin.

Total installed power of the machine is approximately 5630 kW (two oil transformers of 2500 kVA power each and two dry transformers 315 kVA power each). Its largest engines are used for moving of the belt conveyers - two 630 kW power engines are used for unloading

unit, two 630 kW power engines are used for intermediate unit, one 630 kW power engine is used for loading unit. These engines are operating at 690 V voltages and are frequently regulated. Engines of the crawler drives have 110 kW power, operate at 690 V voltages and are also frequently regulated.

All the electrical equipment will be placed in four houses and two operator's cabins. Controlling-steering system will be performed by state-of-art equipment intended for this type of industry. Machine will be equipped by fire protection system, interphones, telephones, radios, video surveillance. Optical fibers connect it to dispatch center, where all the important parameters of its works could be monitored.

Contracted deadline for realization of the project is October 2017. Its realization opens the road to the field with future in Serbia and the region. Construction of this giant machine will be performed outdoor, i.e. assembly lot of the Mining Basin Kolubara and will last for about a year. This will additionally aggravate work performance since the team working on this project will have to spend all four seasons at this location.

ODLAGAČ 12.000-MAŠINA DŽIN / SPREADER 12.000 - GIANT MACHINE:

1.500 t

Težina (približno):

Weight (approximately):

130 m

Dužina (približno):

Length (approximately):

32 m

Visina:

Height:

Kretanje: pomoću tri glavne i dvije pomoćne gusjenice

Movement: three main and two support crawlers

Brzina kretanja: do 6 m/min

Movement speed: up to 6 m/min

NAPAJANJE MAŠINE / MACHINE POWER:

35 kV

SN kabal:

MV cable:

48.000 kg

Na kablovskom bubnju težine:

Cable reeler weight:

3.000 m

Dužina kabla:

Cable length:

Omogućen veliki radijus kretanja

A big movement radius provided

ISPITIVANJE GENERATORA TERMOELEKTRANE STANARI

Testing Stanari Thermal Power Plant Generators



Posljednje u nizu testiranja generatora prije sinhronizacije na elektroenergetsku mrežu bilo je visokonaponsko ispitivanje namotaja statora generatora naizmjeničnim naponom. Ispitivanje je izvela Elnos Grupa u partnerstvu sa institutom Nikola Tesla

The last one in the line of generator testing prior to synchronization with electric power network was the high voltage testing of generator stator coils by alternating voltage. The testing was conducted by the Elnos Group in partnership with Institute Nikola Tesla

SR Početkom januara 2016, prva privatna termoelektrana na Balkanu TE Stanari započela je prvu sinhronizaciju sa energetsom mrežom BiH. Ovim je započeta finalna test-faza, koja će potrajati nekoliko mjeseci. Uprava termoelektrane očekuje da će se dokazati sve tražene performanse i da će komercijalna proizvodnja električne energije početi u drugoj polovini tekuće godine.

Posljednje u nizu testiranja generatora prije puštanja u probni rad, odnosno prije prve sinhronizacije na elektroenergetsku mrežu bilo je visokonaponsko ispitivanje namotaja statora generatora naizmjeničnim naponom. Projekat ispitivanja namotaja statora naizmjeničnim naponom izvela je Elnos Grupa u partnerstvu sa elektrotehničkim institutom Nikola Tesla iz Beograda, u decembru 2015. godine. Korištene su standardne metode ispitivanja, izvedene savremenom opremom, uz poštovanje svih važećih standarda.

Marko Mijić, projekt menadžer Elnos Grupe na ovom poslu, objašnjava da su visokonaponskom ispitivanju prethodile zahtjevne pripreme, kao što su: provjera zaostalih napona, provjere uzemljenja metalnih masa, uzemljenja i zaštite osjetljive mjerne opreme na generatoru, te neophodne provjere ispitne opreme i niz drugih priprema i kontrola koje su obezbijedile sigurnost opreme, ali i angažovanog osoblja.

O kompleksnosti posla Mijić dodaje: „S obzirom na to da se radi o izuzetno rizičnom i opasnom ispitivanju koje se sprovodi na skupoj opremi koja ima kompleksnu i dugotrajnu izradu, ispitivanja ovog tipa sprovode isključivo eksperti. Realizacija je zahtijevala niz radnih sastanaka ispitnog tima, investitora i proizvođača opreme, tokom kojih su utvrđeni

osnovni sigurnosni zahtjevi i, što je najznačajnije, granice testiranja kojima će oprema biti podvrgnuta. Izlaganje opreme visokom ispitnom naponu je izuzetno stresno za opremu i skraćuje životni vijek izolacije, te granica ispitnog napona predstavlja kompromis koji će obezbijediti potvrdu kvaliteta opreme sa jedne strane i minimalno naprezanje i oštećenje opreme sa druge strane.“ On je također napomenuo i da specifičnu opremu za visokonaponska ispitivanja posjeduje samo nekoliko instituta na području bivše Jugoslavije, te da se radi o kompleksnoj i skupoj opremi koja se rijetko koristi, kao i da je ispitivanje realizovano u saradnji sa Institutom Nikola Tesla iz Beograda.

Projekat izgradnje TE Stanari predstavlja jednu od najvećih investicija u energetsom sektoru u Bosni i Hercegovini. Instalirana snaga termoelektrane je 300 MW, sa planiranom godišnjom proizvodnjom od dva miliona MWh električne energije. U TE Stanari koristi se najsavremenije tehnologije, a prva je elektrana u BiH koja u potpunosti funkcioniše u skladu sa direktivama EU o zaštiti životne sredine.

EN At the beginning of January 2016, the first private thermal power plant in the Balkans, TPP Stanari, initiated the first synchronization with the BiH electric power network. This was the beginning of the final test phase, which will take several months. The thermal power plant management expects that all required performances will be proven and that the commercial production of electric power will start in the second half of the current year.

The last one in the line of generator testing prior to probation commissioning, i.e. prior

to the first synchronization with the electric power network, was the high voltage testing of generator stator coils by alternating voltage. The project of stator coil testing by alternating voltage was carried out by the Elnos Group in partnership with the Electrical Engineering Institute Nikola Tesla from Belgrade in December 2015. Standard testing methods were used, conducted with modern equipment in compliance with all valid standards.

Marko Mijić, Elnos Group Project Manager for this project, explains that the high voltage testing was preceded by demanding preparations, such as the following: control of retained voltages, control of earthing of metal parts, earthing and protection of sensitive measuring equipment of the generator, necessary controls of testing equipment and a series of other preparations and controls, which provided both safety of equipment and the engaged of personnel.

Mijić added this about complexity of the project: “Having in mind that this is an extremely risky and dangerous testing conducted with expensive equipment that is built in a complex and time consuming manner, this type of testing is conducted by specialists only. The realization required series of working meetings of the testing team, investors and producers of equipment, during which the basic safety requirements were defined, and most significantly, the limits of testing which the equipment will be subject to. Exposing the equipment to high testing voltage is extremely stressful to the equipment and shortens the working life of insulation; therefore the limit of testing voltage represents an engineering compromise, which will provide verification of equipment quality on one hand and a minimal strain and damage to the equipment on the other hand.”

Mijić also added: “Only a few institutes in the territory of former Yugoslavia possess the specific equipment for high voltage testing. This is a complex and expensive equipment which is seldom used. We performed the testing in cooperation with the Nikola Tesla Institute from Belgrade.”

TPP Stanari construction project represents one of the largest investments in the power sector in Bosnia and Herzegovina. The thermal power plant installed power is 300 MW, with planned annual production of two million MWh of electrical power. State-of-the-art technologies will be used in TPP Stanari, and it is the first power plant in BiH operating totally in compliance with the EU directives on environment protection.

NAKON 44 GODINE SIGURNIJA ISPORUKA ELEKTRIČNE ENERGIJE

Safer provision of electrical power 44 year later



Modernizovana 400 kV trafostanica Vietas u jednoj od najvećih planinskih hidroelektrana na svijetu

Modernized 400 kV substation Vietas in one of the biggest mountain hydro power plants in the world

SR U fantastičnim predjelima sjevera Švedske, u oblasti Arktičkog polarnog kruga, Elnos Grupa je uspješno realizovala još jedan značajan projekat na nordijskom tržištu. Rame uz rame sa brojnim izvođačima radova, modernizovali smo 400 kV trafostanicu Vietas.

Trafostanica Vietas nalazi se u jednoj od najvećih planinskih hidroelektrana na svijetu, moćnoj HE Vietas, čija je snaga 306 MW, a godišnja proizvodnja električne energije 1.124 GWh. Hidroelektrana Vietas bila je specifična po tome što je od puštanja u rad 1971. godine imala dva generatora i samo jedan transformator. Ovim projektom modernizacije i ugradnjom još jednog transformatora riješen je taj debalans, čime je povećana sigurnost isporuke električne energije.

U impresivnim i netaknutim planinskim predjelima, naš tim je počeo sa radovima u junu 2015. godine. Za realizaciju ovog projekta snage je udružilo 28 radnika Elnos Grupe iz divizija za trafostanice i dalekovode. „Izvršili smo poslove montaže visokonaponske opreme i sabirnice 400 kV, rekonstrukcije ulaza i izlaza dalekovoda 400 kV, polaganje 20 kV kabela za

vezu generatora sa transformatorom, polaganje komandno-signalnih kablova i montažu ormara zaštite. Investitor je Vattenfall, a glavni izvođač radova ABB iz Švedske. ABB je isporučio novi transformator, a mi smo ga povezali primarno i sekundarno“, kaže rukovodilac gradilišta Dragan Zorić.

Početak projekta ostao je zapamćen po poprilično jakom vjetru koji je ometao i prekidao radove. Loši vremenski uslovi, kao i niz drugih specifičnosti, nisu bili prepreka da naš veoma iskusen i profesionalan tim završi radove u predviđenim rokovima. Da bismo uspjeli u tome bila je neophodna besprijekorna organizacija, koju nam je nakon petodnevnog boravka na terenu opisao direktor Elnos Nordic-a Milan Martinović. „Imam samo riječi pohvale“, kaže Martinović i dodaje: „Momci odlično rade, spretni su. I kao ljudi i kao majstori su odlični. Imaju rutinu od kako ustanu ujutru do naveče, sve je razrađeno u detalje. Kao direktor firme oduševljen sam njihovim načinom razmišljanja, rada i ponašanja.“

Rad i rezultat našeg tima pohvalili su svi nadležni organi na projektu. „Bilo je veoma stimu-



lativno raditi sa Elnos Grupom, pod rukovodstvom Dragana Zorića. Smatram da je osoblje Elnos Grupe u HE Vietas veoma iskusno i profesionalno“, istakao je Tord Ildund, supervizor iz švedskog ABB-a.

Položaj HE Vietas i njenog generatora učinili su da u jednoj fazi radova monter iskažu sve svoje alpinističke sposobnosti. O ovom pravom poduhvatu Zorić kaže: „Hidroelektrana Vietas je specifična i po tome što se generator nalazi u pećini koja je duboka 70 m i što se do njenih turbina voda doprema iz dva različita jezera, kroz dva tunela. Zbog svega ovoga, polaganje srednjenaponskih kablova bilo je specifično, tačnije problematično, jer je rađeno na stijenama“.

Realizacija kompletnog projekta odvijala se pod budnim okom nezavisnog inspektora iz Švedske. Prenosimo njegove završne riječi: „Kao nezavisni inspektor, želio bih da naglasim da je ABB AB, zajedno sa svojim podgovaračem Elnos Grupom, obavio sjajan posao. Pored





Montaža VN opreme u TS Vietas
Assembly of HV equipment in SS Vietas

toga su na odgovoran način pripremili gradilište kako bi se spriječile nezgode u budućnosti. Pozdravljam Tord Idlunda i montere”.

EN Elnos Group successfully realized another significant project in Nordic market in fantastic region of Sweden North, in the area of the Arctic Circle. Next to numerous contractors, we modernized 400 kV substation Vietas.

Substation Vietas is a part of one of the biggest mountain hydro power plants in the world, powerful HPP Vietas, whose power is 306 MW and annual production of electrical power amounts to 1,124 GWh. Hydro power plant Vietas is specific due to the fact that it has had two generators and only one transformer since its commission in 1971. This modernization project and installation of another transformer solved this imbalance, which increased safety in provision of electrical power. Our team started its works in June 2015 in

Internacionalni tim Elnos Grupe iz Švedske, Srbije i BiH
International team of Elnos Group from Sweden, Serbia and BiH



impressive and untouched mountain sceneries. In order to perform this project, 28 employees of the Elnos Group gathered from sectors for substations and transmission lines. “We assembled high-voltage equipment and 400 kV bus bars, reconstructed entrance and exit of 400 kV transmission line, laid 20 kV cable for connection between generator and transformer, laying control-signal cables and assembly of protection cabinets. Investor is Vattenfall, and the Main Contractor is ABB from Sweden. ABB delivered a new transformer and we connected it primary and secondary”, says Dragan Zorić, Site Manager.

The beginning of the project shall be remembered by pretty strong wind, which interfered and stopped works. Bad weather conditions, as well as a series of other specific features, were not an obstacle for our experienced and professional team in timely work performance. In order to achieve this, faultless organization was necessary. Milan Martinović, the Director of the Elnos Nordic described it after he had spent five days on the field: “I can only compliment it”, says Martinović and adds: “People are doing an excellent job and are skillful. Both as people and professionals are exceptional. They have their routine ever since they get up through to the evening, everything is organized in details. Being the Director of the company, I am delighted by their way of thinking, work and behavior.”

Work and result of our team was praised by all Project Engineers. “It was very motivational to work with Elnos Group, managed by Dragan Zorić. I believe that staff from Elnos Group in HPP Vietas is every experienced and professional”, said Tord Idlund, Project Engineer from Swedish ABB.

Location of HPP Vietas and its generator made fitters present all their climbing abilities on one phase of works. Zorić says the following on this endeavor: “Hydro power plant Vietas is specific one due to the fact that generator is located in a cave 70 m deep and that water to its turbines is provided from two different lakes through two tunnels. Due to all this, laying medium voltage cables was a specific one, meaning problematic, since it was performed on the rocks”.

Realization of entire project was under supervision of Independent Inspector from Sweden. We present his final words to you: “Being Independent Inspector, I would like to say that ABB AB, cooperating with its Subcontractor Elnos Group, did a great work. Apart from this, they prepared the site in a responsible way in order to prevent any future accidents. Hereby I greet Tord Idlund and fitters”.



ENERGIJA IZ VELIKIH RIJEKA SJEVERA

NA VELIKIM RIJEKAMA SJEVERA SMJEŠTEN JE OGROMAN BROJ HIDROELEKTRANA ŠVEDSKE, ČIJA PROIZVODNJA ZADOVOLJAVA 16 ODSTO POTREBA OVE DRŽAVE. MEĐU TIM HIDROELEKTRANAMA, NA 460 KILOMETARA DUGOJ RIJECI LULEELVEN JE I 15 HIDROELEKTRANA VATTENFALL-A SA HE VIETAS.

ENERGY FROM BIG RIVERS OF NORTH

A HUGE NUMBER OF SWEDISH HYDRO POWER PLANTS ARE LOCATED ON BIG RIVERS OF NORTH. PRODUCTION OF THESE PLANTS PROVIDES 16 PER CENT OF THIS COUNTRY'S NEEDS. AMONG THESE HYDRO POWER PLANTS, 15 HYDRO POWER PLANTS BY VATTENFALL WITH HPP VIETAS ARE LOCATED AT 460 KILOMETERS LONG RIVER LULEELVEN.



RADNIČKI KAMP U BAJKOVITOJ PRIRODI

RADNICI ELNOS GRUPE BILI SU SMJEŠTENI U KAMPU PORED HIDROELEKTRANE. PRIRODA JE U OVIM PREDJELIMA ŠVEDSKE BAJKOVITA. PREPLIČU SE PLANINSKI LANCI I VELIKE RIJEKE, UKRAŠENI BROJNIM VODOPADIMA, A MNOGOBROJNI DIVLJI LOSOVI DAJU OVOJ SLICI JEDINSTVENU LJEPOTU.

WORKING CAMP IN FANTASTIC NATURE

ELNOS GROUP EMPLOYEES WERE SITUATED IN THE CAMP NEXT TO HYDRO POWER PLANT. THIS PART OF SWEDISH NATURE IS FANTASTIC. MOUNTAIN CHAINS AND BIG RIVERS CROSS EACH OTHER, ORNAMENTED BY NUMEROUS WATERFALLS AND NUMEROUS WILD MOOSE PROVIDE THIS SCENERY WITH WONDERFUL BEAUTY.

MONTAŽA TRAFOSTANICE **JUNOSUANDO U ŠVEDSKOJ**

Assembly of substation Junosuando in Sweden



U nordijskim uslovima rada u kojima se temperature spuštaju i na minus 30° C, Elnos Grupa je realizovala posao montaže netipične trafostanice od velikog značaja za ovu regiju

In Nordic working conditions, in which temperatures go as low as -30° C, Elnos Group performed assembly works of atypical substation increasingly important for this region

SR Rad u teškim i prirodno veoma nepovoljnim nordijskim uslovima, tokom posljednjih nekoliko godina nikako nije nepoznanica za naše radnike, a posljednji projekat koji smo obavili u sklopu ugovora sa švedskom kompanijom ABB je opet iskušao naše radne sposobnosti na izuzetno niskim temperaturama.

Upravo je još jedan takav test za nas bio rad na montaži trafostanice Junosuando 45/23 kV, u istoimenom mjestu koje se nalazi u polarnom krugu Švedske.

Većinu radova na ovom projektu smo obavili od februara do kraja marta ove godine, a pospštenim podvigom u ovom poslu smatramo činjenicu da smo uprkos teškim okolnostima posao okončali prije roka koji je zadao investitor.

Milan Martinović, direktor Elnos Nordic-a, precizirao je da je izgradnja nove trafostanice bila neophodna, jer je stara bila premala i nije imala potreban kapacitet.

„Izgradnja ove trafostanice je od značaja ne samo za sjeverni dio Švedske, već ima i regionalni značaj“, kaže on.

Kompletni radovi na ovoj trafostanici su bili izvedeni u zgradi u kojoj je ona pozicionirana, a taj prostor se grijao kako bi se moglo raditi.

„Trafostanica se nalazi u objektu u kojem nije bilo električne energije. Temperature su se znale spuštati i na minus 30° C. Radnici su se tokom izvođenja radova grijali pomoću dizel kalorifera, jer se radna temperatura morala podizati na prihvatljivih plus 10° C“, kazao nam je Dragan Zorić, rukovodilac gradilišta na ovom projektu.

Inače, Junosuando je Elnosova druga radna referenca u oblasti trafostanica u Švedskoj, zbog čega ona sa sobom nosi dodatni značaj.

Lazar Petrović, projekt menadžer ovog posla je precizirao da je Elnos Grupa, ovoga puta, suštinski montirala jednu netipičnu trafostanicu.

„Sva 45 kV oprema je za spoljašnju upotrebu, ali je instalirana unutar zgrade, u posebnoj prostoriji. Sabirnice su nosećim izolatorima pričvršćene za plafon, a veza ka energetske transformatorima ostvarena je provodnim izolatorima, dok su 45 kV prekidači montirani pomoću malog mobilnog kрана koji je prošao kroz vrata dimenzija 200x80“, rekao je Petrović.

On je potvrdio da nakon što investitor izvrši prijemno ispitivanje, preostaje još da se polože i povežu energetske kablovi za 45 kV dalekovod ka Finskoj, kako bi se trafostanica nesmetano pustila u pogon.

EN Work in difficult and naturally very unfavorable Nordic conditions in the past several years has been well known to our employees. The latest project we realized in line with the contract signed with the Swedish company ABB again tested our performance abilities at extremely low temperatures.

One of these was assembly of substation Junosuando 45/23 kV, in the place of the same name, which is located in the Swedish Arctic Circle.

We performed most of the works in this project from February until end of March this year. We believe that our own accomplishment in this project was the fact we completed the works before the Investor's deadline despite difficult circumstances.

Milan Martinović, the Director of Elnos Nordic, noted that construction of the new substation was necessary, since the old one was small and did not have necessary capacity.

“Construction of new substation is important not only for the North part of Sweden but also has a regional significance“, says Martinović.

All the works of this substation were performed in the building it is located at, and this space was heated in order to be able to work there.

“Substation is located in the facility where there was no electrical power. Temperatures went as low as -30°C. During work performance, employees were heated by diesel calorifiers since the working temperature had to be increased up to acceptable +10°C“, said Dragan Zorić, Site Manager in this project.

Generally, Junosuando is Elnos's second project reference in the field of substations in Sweden, due to which it has an additional significance.

Lazar Petrović, Project Manager said that, this time, Elnos Group essentially assembled an atypical substation.

“All of 45 kV equipment is used outdoors but it was set up indoors, in a special room. Bus bars were attached to the ceiling by supporting isolators, and connection to energetic transformers was accomplished by wire isolators, whereas 45 kV switchers were assembled by small mobile crane which went through 200x80 doors“, said Petrović.

He confirmed that, once the Investor performs the final testing, there are works of laying and connecting power cables for 45 kV transmission line towards Finland to be done in order to commission substation uninterrupted.



Ekipe Elnos Grupa u TS Junosuando / Elnos Group team in SS Junosuando

LAKTAŠI DOBIJAJU NOVU TRAFOSTANICU

Laktaši to get a new substation



Montaža energetskeg transformatora / Assembly of energetic transformer

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Elnos Grupa je dio konzorcijuma koji gradi novu trafostanicu 110/20 kV Laktaši 2. Ova trafostanica napajaće električnom energijom industrijsku zonu na području opštine Laktaši

Elnos Group is a part of the consortium which has been constructing a new substation 110/20 kV Laktaši 2. This substation will be supplying electrical power to the industry zone in the territory of the Laktaši Municipality

SR U Aleksandrovcu, opština Laktaši, gradi se nova transformatorska stanica 110/20 kV Laktaši 2. Trenutno se područje opštine Laktaši snabdijeva električnom energijom iz jedne trafostanice-110/20 kV Laktaši. Razvoj industrijske zone u Aleksandrovcu, zatim aerodroma Mahovljani, kao i izgradnja auto-puta Banjaluka-Gradiška, doveli su do potrebe za izgradnjom nove trafostanice.

Elnos Grupa je dio konzorcijuma Elektroenergetika, koji za investitora Elektroprenos BiH gradi novu trafostanicu 110/20 kV Laktaši 2. Ova trafostanica napajaće električnom energijom industrijsku zonu na području opštine Laktaši. Uvođenje u posao izgradnje bilo je u aprilu 2015. godine, a rok za završetak radova je oktobar 2016. Kompletne radovi teku prema planiranoj dinamici.

U izgradnji nove trafostanice u Laktašima Elnos Grupa ima značajan udio. Povjereni su nam poslovi: montaže primarne opreme 110 kV i isporuke i montaže energetskeg transformatora snage 20 MVA (tip TRP 20000-123/CW, prenosnog odnosa 110±10x1.5%/21/10.5 kV). Zatim, poslovi kabliranja kompletnog postrojenja 110 kV, kao i povezivanja kablova sa VN opremom i sa ormarima zaštite i upravljanja. Riječ je o najsavremenijim ormarima zaštite i upravljanja za polja 110 kV koji su izrađeni u našoj elektromehaničkoj radionici. Ormari će biti ugrađeni u komandnu prostoriju za smještaj svih ormara i lokalnog monitoring sistema, micro SCADA, sa najsavremenijim rješenjima. Veze lokalnog sistema sa terminalima zaštite i upravljanja, kao i sa sistemom daljinskog nadzora u TS Banja Luka 6 su optičke.

0 TRAFOSTANICI 110/20 kV LAKTAŠI 2

TRAFOSTANICA JE PRENOSNOG ODNOSA 110/20 kV, SA JEDNIM SISTEMOM CIJEVNIH SABIRNICA AlMgSi 100/88, SA UKUPNO PET POLJA, OD KOJIH SE U OVOJ ETAPI FUNKCIONALNO OPREMAJU ČETIRI. PORED POSTROJENJA 110 kV, TRAFOSTANICA ĆE IMATI POSTROJENJE 20 kV, KOJE ĆE BITI SMJEŠTENO U POGONSKOM DIJELU KOMANDNO-POGONSKE ZGRADE. U DRUGOM DIJELU ZGRADE BIĆE KOMANDNA PROSTORIJA ZA SMJEŠTAJ SVIH ORMARA I LOKALNOG MONITORING SISTEMA.

Očekujemo da će se i u narednom periodu radovi obavljati prema dinamičkom planu. Ispitivanje trafostanice treba da izvršimo u avgustu i septembru, nakon čega će ona biti puštena u pogon.

OBIM IZGRADNJE

Konačan obim izgradnje ove transformatorske stanice obuhvata izgradnju dva transformatorska polja 110 kV, dva dalekovodna polja 110 kV, jedno mjerno polje 110 kV, dva transformatora 110/21/10,5 kV, 20/20/14 MVA, izgradnju komandno-pogonske zgrade sa srednjenaponskim postrojenjem 20 kV i pripadajuće građevinske radove na uređenju platoa transformatorske stanice.

Uklapanje nove trafostanice Laktaši 2 planirano je pomoću sistema ulaz-izlaz 110 kV, sa dalekovoda Laktaši-Topola.

EN A new transformer station 110/20 kV Laktaši 2 is under construction in Aleksandrovac, Laktaši Municipality. Laktaši Municipality territory is currently supplied by electrical power from a single substation 110/20 kV Laktaši. Development of the industrial zone in Aleksandrovac, Mahovljani airport as well as construction of the Banja Luka - Gradiška highway resulted in the need for construction of a new substation.

Elnos Group is a part of the Elektroenergetika consortium which has been building a new substation 110/20 Laktaši 2 for the Investor Elektroprenos BiH. This substation will be supplying electrical power to the industry zone in the territory of the Laktaši Municipality. Works were started in April 2015 and the completion deadline is October 2016. Complete works have been on-going in accordance with the planned dynamics.

Elnos Group has a significant part in construction of the new substation in Laktaši.

We have been entrusted the following works: assembly of primary equipment of 110 kV and the delivery and assembly of the power transformer with 20 MVA power (type TRP 20000-123/CW, transfer ratio $110 \pm 10 \times 1.5\% / 21 / 10.5$ kV). Then there are the works of installation of cables for the complete 110 kV plant, as well as connecting of the cables to the HV equipment and protection and control cabinets. These are the state-of-the-art protection and control cabinets for the 110 kV fields produced in our electromechanical workshop. The cabinets will be installed in the control room for housing of all cabinets and local monitoring system, micro SCADA, with the most modern solutions. Connections of the local system with the protection and control terminals, as well as with the remote monitoring system in SS Banja Luka 6, are optical ones.

We expect the works to proceed according to the dynamic schedule in the upcoming period also. We are supposed to test the substation in August and September, to be followed by its commissioning.

SCOPE OF CONSTRUCTION

The final scope of construction of the transformer station includes construction of two

ON SUBSTATION 110/20 kV LAKTAŠI 2

THE SUBSTATION HAS A TRANSMISSION RATION OF 110/20 kV, WITH A SINGLE SYSTEM OF TUBULAR BUS BARS AlMgSi 100/88, WITH A TOTAL OF FIVE FIELDS OUT OF WHICH FOUR ARE BEING FUNCTIONALLY EQUIPPED AT THIS STAGE.

BESIDES THE 110 kV PLANT, THE SUBSTATION WILL HAVE A 20 kV PLANT WHICH WILL BE LOCATED IN THE DRIVE SECTION OF THE CONTROL-COMMAND BUILDING. THE CONTROL ROOM FOR HOUSING OF ALL CABINETS AND LOCAL MONITORING SYSTEM WILL BE LOCATED IN THE OTHER PART OF THE BUILDING.

transformer fields of 110 kV, two transmission line fields 110 kV, one measuring field 110 kV, two transformers 110/21/10.5 kV, 20/20/14 MVA, construction of control-drive building with a medium voltage plant of 20 kV with accompanying construction works in landscaping of the transformer station plateau.

Fitting of the new substation Laktaši 2 was planned through the entry-exit 110 kV system, from the Laktaši-Topola transmission line.



Novi energetski transformator snage 20 MVA / New energetic transformer, power 20 MVA

Značajno povećan kapacitet trafostanice Trebinje

Significantly increased Trebinje substation capacity



Trafostanica 400/220/110/35/10 kV Trebinje / Substation 400/220/110/35/10 kV Trebinje



Trafostanica 400/220/110/35/10 kV Trebinje jedna je od najvećih u bivšoj Jugoslaviji, a povećanje njenog kapaciteta bio je izuzetno kompleksan zadatak povjeren našem konzorcijumu

Trebinje 400/220/110/35/10 kV substation is one of the largest in the former Yugoslavia, and increasing its capacity was an extremely complex task entrusted to our consortium

SR Trafostanica 400/220/110/35/10 kV Trebinje od početka marta 2016. radi sa 30 odsto većim kapacitetom napajanja konzuma sa 220 kV sabirnica. Nakon osam mjeseci intenzivnih radova konzorcijum Elektroenergetika BL, čiji je lider Elnos Grupa, završio je projekat kompletnog opremanja 220 i 110 kV transformatorskog polja TR3 220/110 kV. Ovim je omogućeno puštanje u pogon transformatora TR3 110/220 kV, snage 150 MVA. Realizacijom projekta značajno su povećani prenosni kapacitet i pouzdanost rada sistema trafostanice.

„Na realizaciju ovog projekta čekalo se dugo. Njegov značaj je u postizanju kriterijuma (n-1), kada je u pitanju transformacija 220/110 kV, naročito kada se ima u vidu da je TS Trebinje jedno od najvećih i najznačajnijih elektroenergetskih čvorišta u BiH, sa interkonekcijama prema Crnoj Gori i Hrvatskoj“, istakao je Vukašin Stolica, vođa projekta iz Elektroprenosa BiH. Ova trafostanica jedna je od najvećih u bivšoj Jugoslaviji, a povećanje njenog kapaciteta bio je izuzetno kompleksan zadatak. Investitor Elektroprenos BiH našem konzorcijumu povjerio je

poslove projektovanja, zatim nabavke i ugradnje ormara zaštite i upravljanja i ostale nedostajuće opreme, kao i izvođenje potrebnih građevinskih i elektromontažnih radova.

U sklopu ovog projekta, Elnos Grupa je montirala i povezala VN opremu, pomoćnu opremu, ormara zaštite i upravljanja i integrisala ih u postojeći sistem staničnog upravljanja i nadzora u punoj funkcionalnosti, uključujući istovremenu komunikaciju sa oba SCADA servera. Izvršili smo sva parametrisanja potrebna za integraciju zaštitnih i upravljačkih uređaja u cilju integracije u postojeću LONWork mrežu za komunikaciju između polja i prema SCADA serverima, te testiranje funkcionalnosti SCADA sistema za novi transformator. Ormari zaštite i upravljanja projektovani su i sklopljeni u našoj elektromehaničkoj radionici.

Rekonstrukcije, adaptacije i proširenja postojećih postrojenja uvijek predstavljaju veliki profesionalni izazov. Iz razgovora sa našim kolegama zapažamo da im je najveći izazov, potpuno razumijevanje ostatka postrojenja, kako bi integracija nove opreme u postojeći sistem prote-

kla bez ugrožavanja rada ostatka postrojenja.

Posebno interesantna aktivnost bilo im je konfigurisanje, ispitivanje i puštanje u rad distribuirane sabirničke zaštite 220 kV postrojenja. Ovo je podrazumijevalo profesionalno planiranje beznaponskih stanja pojedinih polja, kako bi bila realizovana primarna i sekundarna ispitivanja zaštitnih terminala pojedinih polja „REB 500 Bay Unit“ i konačno testiranje centralne zaštitne jedinice „REB 500 central Unit“. „Značaj ovog dijela projekta takođe je veliki, dobiće se mnogo na pouzdanosti i selektivnosti sistema zaštite i stabilnosti EES BiH uopšte“, istakao je Stolica.

Na projektu je bilo angažovano oko 30 stručnih ljudi iz Elnosa, različitih kvalifikacija. Taj tim su činili ljudi iz našeg projektog biroa angažovanog na izradi projektne dokumentacije, tim odgovoran za izradu zaštitnih ormara u elektromontažnoj radionici, kao i dva tima na terenu, za montažu opreme i za zaštitu i upravljanje, koji su realizovali potrebne korekcije, konfigurisanje, funkcionalna ispitivanja i konačno puštanje u rad. „Profesionalnost tima Elnos Grupe koji je

radio na realizaciji projekta je bila na visokom nivou. Imali smo odličnu komunikaciju i razumijevanje i sve je urađeno maksimalno korektno i ažurno“, zaključuje Stolica.

Ekipe sa terena ističu da je osam mjeseci rada na pomenutom projektu u Trebinju bio izuzetno prijatan period. Klima u Trebinju je ugodna i karakteriše je mnogo sunčanih dana. Ovaj prelijepi „grad sunca i platana“ privlači veliki broj turista i pruža interesantne turističke atrakcije, te sportske i kulturne manifestacije. Sve ovo je dopunilo profesionalni izazov koji im je pružio projekat u Trebinju.

EN Substation 400/220/110/35/10 kV Trebinje since the beginning of March 2016 works with 30 per cent bigger supply system of users with 220 kV bus bars. After eight months of intensive works, Consortium Elektroenergetika BL, whose leader is Elnos Group, completed the project of comprehensive equipping 220 and 110 kV transformer bay TR3 220/110 kV. This enabled commission of transformer TR3 110/220 kV, with 150 MVA power. Realization of the project significantly increased transfer capacity and work reliability of the substation system.

“We waited for this project realization for long time. Its importance is in achieving criteria (n-1), when we talk about transformation 220/110 kV, especially bearing in mind that SS Trebinje is one of the biggest and most important electrical power system loops in BiH with interconnections toward Montenegro and Croatia“, said Vukašin Stolica, Project Manager from Elektroprenos BiH. This substation is one of the

biggest in the former Yugoslavia and increase of its capacity was extremely complex task. Investor Elektroprenos BiH entrusted our consortium with designing activities, purchase and installation of cabinets for protection and control, remaining missing equipment, as well as performance of necessary construction and electrical assembly works.

In the frame of this project, Elnos Group assembled and connected HV equipment, accessory equipment, cabinets for protection and control and integrated them into existing system of the unit control and monitoring in full functionality, including simultaneous communication with both SCADA servers. We performed all parameterization necessary for integration of protective and controlling devices in the aim of integrating into existing LONWork network for communication among bays and toward SCADA servers, as well as functionality test for SCADA system for new transformer. Cabinets for protection and control were designed and assembled in our electrical-mechanical workshop.

Reconstructions, adaptations and expansion of existing facilities always are big professional challenge. While talking to our colleagues, we note that complete understanding of the rest of the facility is the biggest challenge for them so that integration of new equipment in the existing system goes without affecting the rest of the facility.

Configuration, test and commission of distributed bus bar protection of 220 kV plant was especially interesting activity. This understood

professional planning of off-line facilities of certain bays, in order to perform primary and secondary tests of protective terminals for certain bays “REB 500 Bay Unit“ and, finally, test of central protective unit “REB 500 central Unit“. “Importance of this part of the project also is significant one. We will gain a lot in reliability and selection of the system of protection and stability of EES BiH in general“, said Stolica.

About 30 professionals of various qualifications from Elnos were engaged in the project. This team consisted of people from our design office hired to make designing documentation, a team responsible for making cabinets for protection in electrical-mechanical workshop as well as two teams on the field for assembly of the equipment for control and protection, who performed necessary corrections, configurations, functional tests and commission at the end. “Professionalism of the Elnos Group team who worked in realization of the project was on the high level. We had excellent communication and understanding, and everything was done extremely correctly and in time“, concluded Stolica.

The teams from the field emphasize that the eight months of work on the mentioned project in Trebinje was an extremely pleasant period. The climate in Trebinje is pleasant and has many sunny days. This beautiful “city of sun and sycamores“ attracts a large number of tourists and offers interesting tourist attractions, as well as sportive and cultural events. All of this was an addition to the professional challenge provided by the project in Trebinje.



Funkcionalno ispitivanje transformatorskog polja / Functional test of transformer bay



Trafostanica 400/110/35 kV Ribarevina / Substation 400/110/35 kV Ribarevina

Projekti revitalizacije Trafostanica Pljevlja 2 i Ribarevina

Revitalization projects of SS Pljevlja 2 and Ribarevina

SR Elnos Grupa je nastavila odličnu saradnju sa Crnogorskim elektroprenosnim sistemom (CGES).

Saradnja je nastavljena poslovima projektovanja i izvođenja radova na zamjeni visokonaponske opreme u trafostanici 400/220/110 kV Pljevlja 2 i trafostanici 400/110/35 kV Ribarevina.

Glavni ugovarač ovog posla sa CGES-om je bio podgorički Elnos inženjering, dok poslove izvođenja elektromontažnih radova obavlja operativna Elnosa Beograd. Cilj ovih izazovnih

projekata je da se obje trafostanice kroz rekonstrukciju u potpunosti revitalizuju.

VELIKI ZNAČAJ PROJEKTA

Trafostanica Pljevlja 2 je jedna od ključnih u crnogorskom elektroenergetskom sistemu i njena stabilnost je jedan od prioriteta CGES-a. Na njoj 220 kV strani se sučeljavaju ključni proizvođači električne energije u Crnoj Gori, a to su termoelektrana Pljevlja i hidroelektrana Piva, tj. njena dva dalekovoda. Ova trafostanica predstavlja direktnu vezu sa elektroenerget-

skim sistemom Srbije, odnosno sa hidroelektranom Bajina Bašta i trafostanicom Požega.

Elektromontažni radovi na prvom polju su počeli u novembru 2015, a kompletan posao završen je u julu 2016.

U okviru dosadašnjeg posla obavljena je demontaža starih Energoinvestovih prekidača iz sedamdesetih godina i ugradnja novih LTB 420E2 400 kV prekidača ABB-a, dok se na 220 kV strani u transformatorskim poljima T1 i T2 u TS Pljevlja 2 vršila zamjena kompletne rasklopne primarne opreme.



Inače, trafostanica Pljevlja 2 ima specifičan 220 kV sistem sa tri sistema sabirnica. Ovaj sistem sabirnica zbog visoke investicije nije toliko često primjenjivan, što samo po sebi govori kolika je važnost ovog postrojenja za CGES.

NEMILOSRDNA PRIRODA PRKOSILA OBAVLJANJU POSLA

Tokom izvođenja radova na ovim trafostanicama naši timovi su se susretali sa mnogim prirodnim poteškoćama koje su nam onemogućavale rad i uticale na sam tok projekta. Naime, zemljište na kojem se nalaze trafostanice je močvarno, pa je često dolazilo do zaglavlivanja mašina. Takođe, često se dešavalo da mašine nisu bile u mogućnosti da bez gusjeničarskog pogona prođu kroz neke dijelove trafostanice.

Uz sve to, pratili su nas i ekstremni vremenski uslovi rada sa jakim kišama, snijegom, maglom i temperaturama koje su dostizale -25 stepeni na Celzijusovoj skali. Ipak, i ovi često nehumani uslovi za rad su umnogome prevaziđeni zahvaljujući velikom iskustvu zaposlenih koji su bili angažovani na ovom projektu.

EN Elnos Group continued excellent cooperation with Montenegrin electrical energy distribution system (CGES).

Cooperation was continued in projects of designing and work performance of replacing high-voltage equipment in substations 400/220/110 kV Pljevlja 2 and 400/110/35 kV Ribarevina.

Main Contractor of these works with CGES was Elnos Engineering from Podgorica, whereas works of electrical assembly are performed by employees from Elnos Belgrade. The aim of these challenging projects is to completely revitalize both substations through reconstruction.

BIG SIGNIFICANCE OF THE PROJECT

Substation Pljevlja 2 is one of the key ones in Montenegrin electrical power system and its stability is one of CGES's priorities. Its 220 kV side is location for facing key producers of electrical power in Montenegro and these are Thermal Power Plant Pljevlja and Hydro Power Plant Piva, i.e. its two transmission lines. This substation represents direct connection to electrical power system of Serbia, i.e. to Hydro Power Plant Bajina Bašta and substation Požega.

Electrical assembly works of the first bay started in November 2015 and entire project was completed on July 2016.

In the frame of so-far work, disassembly of

old Energoinvest circuit breakers from 1970s was performed as well as installation of new LTB 420E2 400 kV circuit breakers by ABB, whereas on 220 kV side of transformer bays T1 and T2 in SS Pljevlja 2 entire primary switchgear was replaced.

Namely, substation Pljevlja 2 has a specific 220 kV with three bus bars systems. Due to costly investment, this bus bar system has not been applied often, which also speaks in favor of significance of this plant for CGES.

CRUEL NATURE AGAINST WORKS

During works performance in these substations, our teams confronted many natural difficulties, which made our work impossible and affected the project flow in general. Namely, soil where substations are located mostly is moor, so mechanization often got stuck. Likewise, there was often situation that mechanization could not go through some parts of substation without tracked drive.

Bearing all in mind, we were followed by extreme working conditions with heavy rain, snow, fog and temperatures that went as low as -25 degrees Celsius. However, even these often inhuman working conditions were overpassed in a great measure thanks to employees' rich experience engaged in this project.

Primijenjena rješenja najviših standarda

Solutions of the highest standards applied



Trafostanica 35/10 kV Popovići / Substation 35/10 kV Popovići

Prateći trend rasta broja potrošača u Baru, izgrađena nova trafostanica 35/10 kV Popovići. Izgradnjom ove trafostanice znatno je povećana sigurnost napajanja potrošača gradskog jezgra i prigradskih dijelova Bara

Following in consumers' number growing trend in Bar, new substation 35/10 kV Popovići was constructed. Construction of this substation significantly improved security of supplying consumers of the city center and suburban parts of Bar

SR Elnos Grupa je nastavila niz uspješno realizovanih projekata na području Crne Gore još jednom značajnom referencom. Učestvovali smo u izgradnji nove trafostanice 35/10 kV Popovići u Baru, čiji je investitor Elektroprivreda Crne Gore.

Lazar Petrović, projekt menadžer Elnos Grupe istakao je: „Radovi na ovom projektu izvođeni su u septembru i oktobru 2015. godine, u saradnji sa našim dugogodišnjim partnerom, kompanijom Bemax. Elnos Grupa je izradila glavni projekat, montirala i povezala kompletnu elektro opremu i izvršila ispitivanja, parametrisanje i puštanje u rad trafostanice.“

Rukovodilac Regiona 4 u EPCG Saša Milovanović, ocijenio je da je izgradnjom ove trafostanice znatno povećana sigurnost napajanja potrošača gradskog jezgra i prigradskih dije-

lova Bara. On je dodao da je izgradnja trafostanice Popovići veoma važna, budući da je opterećenje postojećih trafostanica 35/10 kV Topolica i Končar, sa kojih se barski konzum napaja električnom energijom, blizu nominalnog.

Ova trafostanica izgrađena je prema najvišim tehničko-tehnološkim standardima, usklađenim sa urbanističkim i ekološkim zahtjevima. U vezi sa realizacijom poslova Elnos Grupe, Petrović dodaje: „Izvršena je nabavka 35 kV i 10 kV SF₆ postrojenja proizvođača Schneider Electric, uz čiju pomoć smo završili instalaciju čelija u zgradi objekta, kao i montažu i povezivanje energetskih transformatora veličine 8 MVA. U našoj elektromontažnoj radionici proizvedeni su ormari sopstvene potrošnje, koji su potom i instalirani na objektu. Lokalni SCADA sistem su obezbijedile kolege sa instituta Mihajlo Pupin,

dok su naši inženjeri uspješno sproveli ispitivanje sistema relejne zaštite i upravljanja“.

Izgradnjom ove trafostanice, 4.000 potrošača na području Polja, Čeluge i Popovića ima kvalitetnije i stabilnije napajanje električnom energijom. Stvoreni su uslovi za razvoj 10 kV mreže i priključenje novih potrošača, a kapacitet odgovara trendu rasta broja potrošača u Baru, koji bilježi porast od 40 odsto u odnosu na period od prije deset godina.

EN Elnos Group continued a series of successfully performed projects in Montenegro by another important project. We participated in construction of new substation 35/10 kV Popovići in Bar, whose Investor was Elektroprivreda Crne Gore - EPCG (Electric company of Montenegro).

Lazar Petrović, a Project Manager of the Elnos Group, said: “Works of this project were performed in September and October 2015 cooperating with our long-term partner, company Bemax. Elnos Group made the final design, assembled and connected entire electrical equipment and performed test, parameterization and commission of the substation.”

Saša Milovanović, the Head of the Region 4 in the EPCG, said that construction of this substation significantly improved security of consumers of the city center and suburban parts of

Bar. He added that construction of substation Popovići is extremely important since duty of existing substations 35/10 kV Topolica and Končar, which supply Bar consumers with electrical power, close to nominal.

This substation was constructed in line with the highest technical and technological standards, adjusted to urban planning and environmental requests. Referring to works performed by the Elnos Group, Petrović added: “We purchased 35 kV and 10 kV SF₆ plants produced by Schneider Electric, a company that also helped us in installation of switchgears in the building, as well as assembly and connection of electrical power system generators of 8 MVA. Our electrical assembly workshop produced cabinets of local consumption, which were installed in the facility afterwards. Local SCADA system was supplied by colleagues from the Institute Mihajlo Pupin, whereas our engineers successfully tested systems of relay protection and control”.

Construction of this substation provides 4,000 consumers of the areas Polje, Čeluga and Popovići with better quality and more stable supply of electrical power. There were conditions created for development of 10 kV network and connection of new consumers and capacity is in line with consumers' number growing trend in Bar, which has increased for 40 per cent compared to ten-years' period.

OPREMA

NOVA TRAFOSTANICA POPOVIĆI JE INSTALIRANE SNAGE 2X8 MVA. RAZVODNO POSTROJENJE 35 kV SASTOJI SE OD PET IZVODNIH, DVIJE TRAFO-ČELIJE, JEDNE SPOJNE I JEDNE MJERNE ČELIJE. POSTROJENJE 10 kV, PORED MJERNE I SPOJNE, OPREMLJENO JE SA 17 IZVODNIH ČELIJA.

EQUIPMENT

NEW SUBSTATION POPOVIĆI HAS INSTALLED 2X8 MVA POWER. 35 kV DISTRIBUTION PLANT CONSISTS OF FIVE OUTGOING, TWO SUBSTATION SWITCHGEARS, ONE CONNECTION SWITCHGEAR AND ONE MEASURING SWITCHGEAR. APART FROM HAVING MEASURING AND CONNECTING SWITCHGEAR, 10 kV PLANT WAS ALSO EQUIPPED WITH 17 OUTGOING SWITCHGEARS.



Istovar i ugradnja transformatora 35/10 kV, 8 MVA / Unloading and installations of transformer 35/10 kV, 8 MVA

Obezbijeden pouzdaniji rad

More secure work provided



U trafostanici 110/x kV Ukrina izgrađeno je novo dalekovodno polje 110 kV za Kotor Varoš. Posao naše kompanije obuhvatio je sve radove, osim građevinskih

A new transmission line field 110 kV constructed for Kotor Varoš in substation 110/x kV Ukrina. Our company's performance comprised all works save construction ones



Elektromontažni radovi u TS 110/x kV Ukrina / Electrical assembly works in SS 110/x kV Ukrina

SR Trafostanica Ukrina jedna je u nizu trafostanica naponskog nivoa 110 kV koje se rekonstruišu u velikom investicionom ciklusu Elektroprenosa BiH. Izgradnja novog 110 kV dalekovodnog (DV) polja u ovoj trafostanici povjerena je konzorcijumu Elektroenergetika, čiji je lider Elnos BL Banjaluka. Uvođenje u posao je bilo u aprilu 2015. godine, a rok za izvođenje radova je godinu dana. Projekat je završen u roku, po svim standardima struke.

U trafostanici 110/x kV Ukrina izgrađeno je novo dalekovodno polje 110 kV za Kotor Varoš. Kompletan projekat obuhvatao je nabavku i ugradnju opreme i materijala, izradu projektne dokumentacije i izvođenje radova na izgradnji novog DV polja 110 kV. Posao naše kompanije obuhvatio je sve navedeno, osim građevinskih radova. Kompletne elektromontažni radovi obuhvatali su poslove: montaže visokonaponske opreme, montažu ormara zaštite i upravljanja, te kabliranje i povezivanje navedene opreme, zatim kompletna ispitivanja funkcionalnosti opreme, ispitivanja telekomunikacionih veza sa daljinskim centrom Elektroprenosa BiH, te ispitivanja zaštite i upravljanja.

Radovi su izvedeni u periodu od februara do aprila 2016. godine.

Novoizgrađeno dalekovodno polje 110 kV za Kotor Varoš će, zajedno sa novim dalekovodom 110 kV Kotor Varoš-Ukrina, omogućiti vezu 110 kV trafostanica Kotor Varoš i Ukrina. Ovo DV polje će u potpunosti biti operativno nakon puštanja navedenog dalekovoda pod napon. Izgradnjom novog DV polja obezbijedena je veća pouzdanost rada TS 110/x kV Ukrina.

EN Substation Ukrina is one of the substations in a series of substations of voltage level 110 kV, which are being reconstructed in big investment cycle of the company Elektroprenos BiH. Construction of new 110 kV transmission line (TL) field in this substation has been entrusted to consortium Elektroenergetika, whose leader has been Elnos BL Banjaluka. Works started in April 2015 and works were to be completed in a year's period. Project was performed within the deadline and in line with all the professional standards.

Substation 110/x kV Ukrina got a new transmission line field 110 kV for Kotor Varoš.

Entire project included purchase and installation of equipment and materials, making design documentation and works performance in construction of TL field 110 kV. Our company performed all the aforementioned works save the construction ones. Complete electrical assembly works included the following activities: assembly of high voltage equipment, assembly of protection and control cabinets, cabling and connection of the listed equipment, entire tests of equipment functionality, test of telecommunication connections with remote center of the company Elektroprenos BiH, as well as test of protection and control. Works were performed in the period from February to April 2016.

Newly constructed transmission filed 110 kV for Kotor Varoš, along with new transmission line 110 kV Kotor Varoš-Ukrina, shall enable connection of 110 kV substations Kotor Varoš and Ukrina. This transmission line field shall be operational totally after putting the mentioned transmission line under voltage. Constructing new TL field provides better reliability of SS 110/x kV Ukrina work.

Rekonstruisana trafostanica Jug u Novom Pazaru

Substation South in Novi Pazar reconstructed



Prvi projekat u Srbiji realizovan sa zaštitnim uređajima poznatog njemačkog proizvođača Stucke

The first project in Serbia realized with protective devices made by the renowned German producer Stucke



Novi AC/DC razvod / New AC/DC distributors

SR Rekonstrukcija trafostanica uz ugradnju najsavremenije opreme predstavlja užu specijalnost rada Elnos Grupe, a efikasno izvođenje radova na trafostanici Jug u Novom Pazaru je jedan od boljih primjera naše uspješnosti u ovakvim projektima.

Kompanija Elnos Grupa je za investitora EPS-PD Elektrosrbija Kraljevo, tokom aprila i maja prošle godine u potpunosti realizovala projekat rekonstrukcije sistema relejne zaštite i daljinskog upravljanja u trafostanici 35/10 kV Jug u Novom Pazaru.

Kako je i planirano ovim projektom, u trafostanicu Jug je ugrađeno 17 novih zaštitno-upravljačkih uređaja proizvođača Štuke (Stucke), nova niskonaponska oprema, AC i DC razvod, protivprovalni i protivpožarni sistem, kao i sistem daljinskog upravljanja Instituta Mihajlo Pupin, koji je integrisan u postojeći sistem daljinskog upravljanja u Dispečerskom centru Elektrodistribucije Novi Pazar.

Ovo je bio prvi projekat u Srbiji realizovan sa zaštitnim uređajima poznatog njemačkog proizvođača, čiji su se uređaji pokazali kao odlično rješenje za rekonstrukcije postojećih srednjenaponskih trafostanica.

Projekat rekonstrukcije u TS Jug je završen u kratkom roku, između šest i sedam sedmica, i to uprkos djelimičnim isključenjima trafosta-

nice tokom radova, koja su bila neophodna kako se ne bi ugrozilo stabilno snabdijevanje grada.

Rekonstrukcija trafostanice Jug, koja se nalazi u urbanom dijelu Novog Pazara, doprinijela je značajno stabilnijem snabdijevanju električnom energijom ovog velikog grada na jugozapadu Srbije. Ovim poduhvatom je ujedno riješen i ogroman dugogodišnji problem neadekvatnosti starog sistema relejne zaštite, koji je ugrađen još sedamdesetih godina prošlog vijeka, kao i komplikacije do kojih je dolazilo zbog nemoćnosti brzog reagovanja službi u slučaju kvara i prestanka napajanja potrošača električnom energijom.

EN Reconstruction of substations with installation of the most modern equipment is what the Elnos Group specializes in, while the successful performance of works at the substation South in Novi Pazar is one of the better examples of our success in such projects.

Elnos Group company fully realized the project of reconstruction of relay protection and remote control in substation 35/10 kV South in Novi Pazar, for the investor EPS-PD Elektrosrbija Kraljevo during April and May last year.

In the course of this project, 17 new protective-control devices produced by Stucke was installed in substation South, along with new

low voltage equipment, AC and DC distributors, anti-burglary and fire alarm system, as well as the remote control system by Institute Mihajlo Pupin, integrated into the existing remote control system in the Novi Pazar Electric Utility Dispatcher Center.

This was the first project in Serbia realized with protective devices made by the renowned German producer, whose devices have turned out to be an excellent solution for reconstruction of existing medium voltage substations.

The reconstruction project in SS South was completed in a short time frame, between six and seven weeks, despite partial disconnecting of the substation during the works which were necessary in order to maintain stable supply to the city during the works.

The reconstruction of substation South, located in the urban area of Novi Pazar, made a significant contribution to more stable supply of electrical power to this big city in the Southwest Serbia. This venture at the same time solved a huge long-standing problem of inadequacy of the old relay protection system installed in way back in the seventies of last century, as well as the complications which had been occurring due to inability of fast reaction of the services in the event of malfunctions and interruptions in supplying electrical power to consumers.

*Reconstructed transmission line in
the area of the Arctic Circle on Iceland*

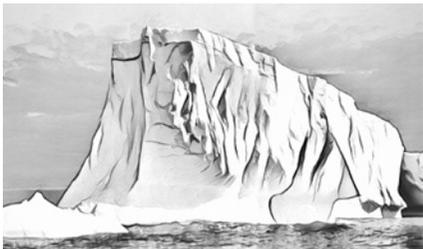
REKONSTRUISAN DALEKOVOD

U OBLASTI ARKTIČKOG KRUGA NA ISLANDU

*Iako je lokacija na kojoj su izvođeni radovi izuzetno zahtjevna, a vremenski uslovi otežani,
Elnos Grupa je uspješno završila sve radove na projektu Sigöldulina 3*

*Although works performance site is a very demanding one, and weather conditions aggravated,
Elnos Group successfully completed all works of the project Sigöldulina 3*





ISLAND, ZEMLJA EKSTREMNIH KONTRASTA

ISLAND JE ZEMLJA EKSTREMNIH KONTRASTA. POZNAT KAO „ZEMLJA VATRE I LEDA“, ISLAND JE DOM ZA NEKE OD NAJVEĆIH GLEČERA U EVROPI I NEKE OD NAJAKTIVNIJIH VULKANA NA SVIJETU. ISLAND JE TAKOĐE ZEMLJA SVJETLOSTI I TAME. DUGI LJETNI DANI SA SKORO 24 ČASA SUNČEVE SVJETLOSTI OPOZIT SU KRATKIM ZIMSKIM DANIMA SA SVEGA NEKOLIKO SATI DNEVNOG SVJETLA.

ICELAND, COUNTRY OF EXTREME CONTRASTS

ICELAND IS A COUNTRY OF EXTREME CONTRASTS. KNOWN AS “LAND OF FIRE AND ICE”, ICELAND IS HOME FOR SOME OF THE BIGGER GLACIERS IN EUROPE AND SOME OF THE MOST ACTIVE VOLCANOES IN THE WORLD. ICELAND ALSO IS A LAND OF LIGHT AND DARKNESS. LONG SUMMER DAYS WITH ALMOST 24 HOURS OF SUNLIGHT ARE OPPOSITE TO SHORT WINTER DAYS WITH ONLY A FEW SUNLIGHT HOURS.



SR Elnos Grupa je 4. septembra 2015. završila prvi projekat na Islandu, šest dana prije ugovorenog roka. Za islandski elektroprenos Landsnet, izvršili smo dio radova na rekonstrukciji dalekovoda 220 kV Sigöldulina 3. Iza ove dvije kratke rečenice stoje mjeseci iscrpnih priprema i radova u kojima su savladani brojni izazovi, sa jedne strane ovog izuzetno odgovornog i složenog projekta, a sa druge potpuno novog i specifičnog tržišta.

Naš prvi projekat na ovom fascinantnom ostrvu bio je organizaciono veoma kompleksan. Osvrnemo li se na to kako su ljudi i mehanizacija stigli na Island, vidjećemo da je to bio veliki logistički izazov. Put od Banjaluke, preko Danske do Islanda nije samo dug. „Problemi sa kojima smo se mi suočavali na Islandu, specifične su prirode. Island ima morsku vezu sa Evropom, ali kargo brodovi za prevoz

vozila plove jednom sedmično. Island je popularna turistička destinacija, pa je potrebno mnogo ranije rezervirati trajekt“, objašnjava Davor Purušić, Senior Advisor Elnos Grupe na Islandu. Zatim dodaje: „Island je država koja ima oko 330.000 stanovnika. U prvom trenutku teško je shvatiti koliko je to malo tržište i društvo. Dolaskom ekipe koja je brojala 32 montera i pomoćno osoblje, na Islandu smo se suočili sa kulturnim razlikama i nizom završnih organizacionih izazova.“

U julu je počela realizacija projekta rekonstrukcije dalekovoda 220 kV Sigöldulina 3. Radovi su izvođeni u dolini najduže rijeke na Islandu – Þjórsá, u oblasti Arktičkog kruga, gdje nam je Landsnet ustupio svoj kamp. „Mi smo uradili zamjenu postojećeg provodnika koji je presjeka 456 mm² provodnikom 1.145 mm². Takođe, na kompletnoj dionici daleko-

voda dužine 36 km izvršili smo zamjenu svih izolatorskih lanaca kao i prigušivača vibracija“, kaže Purušić.

Ogroman izazov za naše radnike bili su surovi vremenski uslovi sa svakodnevnim jakim vjetrom i kišom, zbog kojih je čak i u ovim ljetnim mjesecima hladno, sa prosječnim temperaturama od +15 do +20°C. Rad su otežavali i rojevi mušica, specifičnih za pomenutu dolinu. Radnicima je trebalo desetak dana da se priviknu na ove uslove. Pored toga, bilo je neophodno da obezbijedimo specijalnu radnu i zaštitnu opremu vodećeg islandskog proizvođača, proizvedenu specijalno za ove teške uslove rada.

Rukovodilac gradilišta Elnos Grupe Slobodan Mičić ističe: „Radni dan je trajao standardnih osam do deset časova. Međutim, mjesec i po radili smo u dvije smjene, nekada i do po-



noći. Razlog za to su elektromontažni radovi na instalaciji specifičnih prigušivača vibracija. Tako smo preko dana razvlačili provodnike, a nakon pauze, od oko 18 časova nastavljali rad na ovim prigušivačima vibracija.“

Nosili smo se sa još jednim posebnim profesionalnim izazovom. Prema zahtjevu islandskog elektroprenosa u svakom trenutku morali smo biti spremni da u roku od četiri sata, u slučaju potrebe, obezbijedimo uslove za puštanje dalekovoda pod napon. Razlog za to je što se radi o strateški važnom dalekovodu koji povezuje četiri hidroelektrane sa dvije najveće fabrike aluminijuma u Reykjaviku.

Na projektu je bila angažovana kompanija Ara sa Islanda, zadužena za nadzor i kontrolu kvaliteta izvedenih radova. I oni su se uvjerali u opremljenost i visoku stručnost naših zaposlenih: „Elnos je odlično opremljen za

ovaj projekat. Radnici su veoma sposobni i očigledno kvalifikovani za ovu vrstu posla“, ocijenio je njihov Construction Architect BSc Þórmundur H Sigurjónsson.

Naš poslodavac Landsnet u okviru projekta rekonstrukcije povećao je nazivni napon dalekovoda Sigöldulina 3 sa 130 na 220 kV, a kapacitet sa 300 na 600 MW. Dobra realizacija elektromontažnih radova rezultirala je još jednim zadatkom koji nam je povjerio Landsnet. Izvršili smo demontažu šest dotrajalih dalekovodnih stubova i montirali i instalirali sedam novih. Svi stari stubovi i provodnici reciklirani su u skladu sa najvećim svjetskim standardima.

Tokom slobodnog vremena radnici su uživali u ocharavajućim prirodnim ljepotama Islanda. „Zemlja je prelijepa i surova u isto vrijeme. Ostavila je jak utisak na nas, kao da smo doživjeli neku avanturu, gledajući neopisivo lijepe rijeke, vodopade, polja lave“, kaže Mičić.

Iako je lokacija na kojoj su izvođeni radovi izuzetno zahtjevna, a vremenski uslovi otežani, Elnos Grupa je uspješno završila sve radove na projektu Sigöldulina 3. Značajno je pomenuti da je finalna inspekcija investitora završena bez ijedne primjedbe na rad i kvalitet izvedenih radova, na šta smo kao kompanija izuzetno ponosni.

EN Elnos Group completed the first project on Iceland on September 4, 2015, which was six days before contracted deadline. We performed a part of works on upgrade of 220 kV Sigöldulina 3 transmission line for Icelandic electrical power transmission network Landsnet. There are months of exhausting preparations and works of many challenges overcome behind these two sentences. This project was both extremely responsible and complex and a part of completely new and specific market.

Our first project on this fascinating island was very complex in organization. If we remember how staff and mechanization got to Iceland, we could see it was a big logistic challenge. Trip from Banja Luka, through Denmark to Iceland is not a long one only. “Problems we faced on Iceland are specific ones. Iceland has sea connection to Europe but cargo ships for transport of vehicles commute once a week. Iceland is a popular touristic destination, so you need to book a ferry long time ahead”, explains Davor Purušić, Senior Advisor of the Elnos Group on Iceland. Then he adds: “Iceland is a state with about 330,000 inhabitants. At first, it is hard to comprehend how small mar-

ket and society it is. When a team of 32 fitters and laborers came to Iceland, we faced cultural differences and a series of final organizational challenges.”

Realization of the upgrading project of the 220 kV Sigöldulina 3 transmission line started in July. Works were performed in the valley of the longest river on Iceland – Þjórsá, in the area of the Arctic Circle, where Landsnet provided their camp on our disposal. “We replaced the existing conductor 456 mm² in cross-section by conductor 1,145 mm² in cross-section. Likewise, we replaced all iso-



UKUSI ISLANDA

ZBOG PRIRODE POSLA I RAZLIKA U VRSTI HRANE, NAŠ KUVAR JE RADNICIMA PRIPREMAO NAŠU TRADICIONALNU HRANU. NARAVNO, PRIPREMANA SU I ISLANDSKA TRADICIONALNA JELA, U KOJIMA PEOVLADAVA RIBA. IAKO SU ŠVEDSKA I ISLANDSKA KUHINJA SLIČNE, NAŠE KOLEGE DALE SU BOLJE OCJENE ISLANDSKOJ HRANI, JER JE SMATRAJU DOSTA UKUSNIJOM.

ICELAND TASTES

DUE TO WORKS NATURE AND DIFFERENCES IN FOOD, OUR COOK PREPARED OUR TRADITIONAL FOOD TO OUR EMPLOYEES. OF COURSE, ICELANDIC TRADITIONAL MEALS WERE ALSO PREPARED, AND FISH IS PRIORITY OF THESE. ALTHOUGH SWEDISH AND ICELANDIC COOKING IS SIMILAR, OUR COLLEAGUES GAVE BETTER MARKS TO ICELANDIC FOOD SINCE THEY THINK IT IS MORE TASTEFUL.

lating chains as well as vibration suppressors of entire conductor route 36 km long”, says Purušić.

Rough weather conditions were enormous challenge to our employees with everyday strong wind and rain due to which, even in summertime, is cold with average temperatures from +15 to +20°C. Work was also aggravated by swarm of flies, which are specific feature of the mentioned valley. Employees needed about ten days to accommodate to these working conditions. Apart from this, it was necessary to provide special working and protective equipment of the leading Iceland producer, especially made for these conditions.

Slobodan Mičić, Site Manager for Elnos Group says: “Work day lasted for standard eight to ten hours. However, for forty-five days we worked in two shifts – sometimes till midnight. This was due to electrical assembly works of installations for specific vibration suppressors. So, during the day we were laying conductors, and, after the break, at about 6 in the afternoon, we would continue the work on these vibration suppressors.”

We faced another special professional challenge. According to request by Iceland electrical power transmission system, we were to be ready to provide conditions for on-line condition of the transmission line at any moment in the frame of four-hour period if necessary. It was due to the fact this is a strategically important transmission line connected four hydro power plants with two biggest aluminum

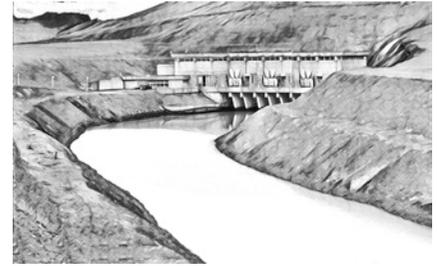
factories in Reykjavik.

Company Ara from Iceland was hired for the project and was in charge of supervision and control of the quality of performed works. They also had a chance to see readiness and high level of professionalism of our employees: “Elnos is excellently equipped for this project. Employees are very skillful and obviously qualified for this type of work”, said their Construction Architect BSc Þórmundur H Sigurjónsson.

In the upgrade project, our Employer Landsnet increased nominal voltage of the transmission line Sigöldulin 3 from 130 to 220 kV and capacity from 300 to 600 MW. Realization of electrical assembly works resulted in another task entrusted to us by Landsnet. We disassembled six worn-out transmission lines poles and assembled and installed seven new poles. All old poles and conductors were recycled in line with highest world standards.

In free time, employees enjoyed fascinating natural beauties of Iceland. “Country is beautiful and rough at the same time. It impressed us in a great measure, as if we experienced some adventure by watching incredible beautiful rivers, waterfalls, lava fields”, says Mičić.

Although the site is extremely demanding, and weather conditions aggravated, Elnos Group successfully completed all the works of the project Sigöldulina 3. It is important to mention that final inspection by Investor was performed without any remark for work and quality of performance, which we, as a company, are very proud of.



LIDER U KORIŠTENJU OBNOVLJIVIH IZVORA ENERGIJE

ISLAND JE JEDINA ZEMLJA NA SVIJETU KOJA KORISTI 100 ODSTO OBNOVLJIVE IZVORE ENERGIJE ZA PROIZVODNJU ELEKTRIČNE ENERGIJE I ZA GRIJANJE. OD TOGA 80 ODSTO ELEKTRIČNE ENERGIJE DOLAZI IZ HIDROELEKTRANA, A 20 ODSTO IZ GEOTERMALNIH IZVORA, ŠTO ISLAND SVRSTAVA U RED LIDERA U GEOTERMALNOM RAZVOJU I IZVOZU TEHNIČKE EKSPERTIZE U TOJ OBLASTI.

LEADER IN USING RENEWABLE ENERGY SOURCES

ICELAND IS THE ONLY COUNTRY IN THE WORLD TO USE 100 PER CENT OF RENEWABLE ENERGY SOURCES FOR PRODUCTION OF ELECTRICAL POWER AND HEATING. 80 PER CENT OF THIS ELECTRICAL POWER COMES FROM HYDRO POWER PLANTS AND 20 PER CENT FROM GEOTHERMAL SOURCES, WHICH PUTS ICELAND IN THE CLASS OF LEADERS IN GEOTHERMAL DEVELOPMENT AND EXPORT OF TECHNICAL EXPERTISE IN THIS FIELD.



Radovi na DV 220 kV Sigöldulina 3 na Islandu / Works on TL 220 kV Sigöldulina 3 on Iceland

LAVOVSKI PODUHVAT

na islandskom Thorskaufjord-u

Giant project in Iceland Thorskaufjord



Prilazni put tokom oseke / Approach road during ebb tide



Posao zamjene provodnika starog 35 godina bio je kao napeti, šestodnevni akcioni triler, u kome se 15-ak najiskusnijih i najspretnijih montera borilo sa fantastičnom i divljom prirodom, specijalnom opremom i izdržljivošću najmodernijih mašina

Project of 35 years old conductor replacment was as an edgy, six days long action thriller movie, where about 15 the most experienced and most skillful fitters fought fantastic and wild nature by special equipment and durance of the most modern mechanization

SR Fjordovi se smatraju nekim od najljepših čuda prirode: uzani, krivudavi, usječeni duboko u kopno. U jednom od ovih morskih zaliva na sjeverozapadnom čošku Islanda, Thorskaufjord-u, naš dalekovodni tim obavio je izuzetno opasan posao. To je projekat zamjene provodnika na dalekovodu Mjólkárlína 1, rađen krajem septembra 2015, za Landsnet.

Posao zamjene provodnika starog 35 godina bio je kao napeti, šestodnevni akcioni triler, u kome se 15-ak najiskusnijih i najspretnijih montera borilo sa fantastičnom i divljom prirodom, specijalnom opremom i izdržljivošću najmodernijih mašina.

„Instalirali smo specijalni provodnik koji može podnijeti poboljšana mehanička i ostala svojstva, jer je tu, na fjordju, konstantno izložen vjetru i slanoj morskoj vodi. Taj provodnik je težak 5,5 kg/m. Prvi put smo imali priliku da radimo sa provodnikom tolike težine. Zbog velike težine i velikog presjeka 772 mm², imali

smo ekstremno velike sile prilikom razvlačenja i zatezanja provodnika. Vučna sila na tom provodniku bila je 12 t, a na samom zatezanju dobijali smo silu do 17 t, što je na samoj granici dozvoljenoj za naše mašine. Poređenja radi, ove sile nikada ranije nisu prelazile 12 tona. Ekstremno je opasno za rad. Upotrebljavali smo specijalnu opremu, mašine smo ankerisali sa brodskim sajlama 5 cm debljine i zakopavali 3,5 m u zemlju, jer smo očekivali velike sile tokom realizacije radova“, kaže rukovodilac gradilišta Slobodan Mičić.

Zamjena provodnika rađena je preko fjorda, raspon između stubova je bio 1,3 km. „U fjordju smo morali pratiti plimu i oseku, jer se za vrijeme plime nivo vode podiže preko 5 m“, kaže Mičić i dodaje: „Betonski stubovi na fjordju su iznad tla 8,5 m, a svaki ima tri betonske noge, 10 m u zemlji. Sam tip stuba i dubina temelja govori o posebnim uslovima i silama koje se tu javljaju“.

Investitor je bio izuzetno zadovoljan uspješnom realizacijom ovog ekstremno opasnog i tehnički kompleksnog posla, praktično lavovskog poduhvata. Mali broj kompanija može uraditi poslove ove vrste, jer je osim vrhunskih montera, neophodna i najsavremenija oprema i mehanizacija.

EN Fiords are considered to be one of the most beautiful natural wonders: narrow, winding, cut in deeply in the land. In one of these sea bays, Thorska fjord, at North-West corner of Iceland, our transmission line team performed extremely difficult work. It was project of replacing conductor of transmission line Mjólkárlína 1, performed in September 2015, for Landsnet.

Project of 35 years old conductor replacement was as an edgy, six days long action thriller

movie, where about 15 the most experienced and most skillful fitters fought fantastic and wild nature by special equipment and durance of the most modern mechanization.

“We installed a special conductor that can endure improved mechanical and other features, since here, in fiord, it is constantly exposed to wind and salty sea water. This conductor weighs 5.5 kg/m. It was our first time to work with such a heavy conductor. Due to the weight and big diameter - 772 mm², we were confronting extremely high powers in setting it and tensioning it. Towing force of this conductor was 12 t, and in tensioning we got force up to 17 t, which is a very limit for our mechanization. Just for comparison, these forces never crossed 12 tons before. It is extremely dangerous for work. We used special equipment. We anchored mechanization by ship cables 5 cm

thick and dug 3.5 m deep in the land, since we expected big forces in work performance”, says Slobodan Mičić, Site Manager.

Conductor replacement was made through fiord. Pole distance was 1.3 km. “We had to follow tides in fiord, since the water could rise up to 5 m”, says Mičić and adds: “Concrete poles in fiord are above the ground for 8.5 m, and each of them has three concrete bases, 10 m in the ground. Pole type itself and foundation depth speaks in favor of special conditions and forces appearing here”.

Investor was really satisfied by successful realization of this extremely dangerous and technically complex project, meaning giant project. A small number of companies is able to perform project of this type, since, apart from first-class fitter, they would need state-of-art equipment and mechanization.

Rekonstruisan još jedan dalekovod u Švedskoj

Upgrade of another transmission line in Sweden



Projekat je realizovan korištenjem robota, a monteru su u svoje bogate biografije dodali još jedan atraktivan metod rada

Project was performed by using robot and fitters added another attractive work method in their rich biographies



Podizanje stubova / Erection of poles



pletion of the project in planned deadlines. We performed transmission line entrance and exit to the substation, cut old transmission line, disassembled two poles, assembled and erected 11 new poles. Afterwards, we performed electrical assembly works and installed about 11 km of OPGW. Due to big number of crossovers, we performed works with robot's help, so called 'cable cat', and hence added another attractive work method in our rich biographies.

End goal was achieved by correct cooperation of all project participants and conditions for production increase in the paper factory were created.



SR Realizacijom još jednog uspješnog projekta u Švedskoj, nastavljena je dugogodišnja saradnja sa vodećim švedskim kompanijama Vattenffal i Linjemontage i Grästorp AB. Ovoga puta spojio nas je projekat čiji je cilj obezbjeđenje kvalitetnijeg napajanja električnom energijom fabrike papira Billerud Korsnäs AB u mjestu Frövifors.

Naime, trafostanica pomenute fabrike papira proširena je izgradnjom novog 130 kV dijela. Investitor projekta je Vattenffal, a kompanija Linjemontage i Grästorp AB radila je na povećanju kapaciteta trafostanice. Dio posla Elnos Grupe bila je rekonstrukcija raspleta dalekovoda naponskog nivoa 130 kV, koji se nalazi ispred ove trafostanice.

Projekat je realizovan od kraja marta do sredine maja 2016, a u njegovu realizaciju direktno je bilo uključeno 28 radnika Elnos Grupe. Rekonstrukcijom dalekovoda obuhvaćen je različit spektar poslova: demontaža postojećih stubova, montaža novih stubova, instalacija zaštitnog užeta i OPGW-a sa kompletnom opremom.

Izvođenje svih radova bilo je ograničeno planiranim isključenjima, što nije uticalo na to da projekat završimo u planiranim rokovima. Uradili smo ulaz i izlaz dalekovoda u trafostanicu, rasjekli stari dalekovod, demontirali dva stuba, montirali i podigli 11 novih stubova, a zatim uradili elektromontažne radove i instalirali oko 11 km OPGW-a. Zbog velikog broja ukrštanja, radove smo izveli pomoću robota, tzv. kejl keta,

i tako dodali još jedan atraktivan metod rada u svoje bogate biografije.

Korektnom saradnjom svih učesnika u projektu ostvaren je krajni cilj, odnosno stvoreni su uslovi za povećanje proizvodnje u fabrici papira.

EN By performance of another successful project in Sweden, we continue long-term cooperation with leading Swedish companies Vattenffal and Linjemontage i Grästorp AB. This time, we gathered for the project with aim to provide better quality of electrical power supply for paper factory Billerud Korsnäs AB in Frövifors.

Namely, substation of the mentioned paper factory was extended by construction of new 130 kV part. Vattenffal is the Investor of the project and company Linjemontage i Grästorp AB performed upgrade of the substation capacity. A part of the works performed by Elnos Group was reconstruction of TL lines of 130 kV, which located in front of this substation.

Project was performed from end of March to mid-May 2016 and 28 employees of the Elnos Group were directly participating in its performance. Transmission line upgrade included various specters of activities: disassembly of the existing poles, assembly of new poles and installation of protective rope and OPGW with entire equipment.

Performance of all works was limited by planned turning offs, which did not affect com-

U KAMPU ŠVEDSKOG ŠTIHA

RADNICI ELNOS GRUPE BILI SU SMJEŠTENI U KAMPU U GRADIĆU LINDESBERG, UDALJENOM 20 KILOMETARA OD GRADILIŠTA. U OVOM MIRNOM KAMPU KARAKTERISTIČNOG ŠVEDSKOG ŠTIHA IMALI SU PRILIKU DA DOŽIVE NOVA SPORTSKA ISKUSTVA. NA RASPOLAGANJU IM JE BIO ODLIČAN GOLF TEREN, PA SU NEKI OD NJIH PRVI PUT IGRALI GOLF.

IN CAMP OF SWEDISH ATMOSPHERE

ELNOS GROUP EMPLOYEES WERE ACCOMMODATED IN A CAMP IN TOWN LINDESBERG, 20 KILOMETERS AWAY FROM THE SITE. THEY HAD A CHANCE TO EXPERIENCE NEW SPORT EXPERIENCES IN THIS PEACEFUL CAMP OF CHARACTERISTIC SWEDISH ATMOSPHERE. THEY HAD A GREAT GOLF FIELD ON DISPOSAL SO SOME OF THEM PLAYED GOLF FOR THE FIRST TIME.

Novi kilometri u ENERGETSKOJ MREŽI ŠVEDSKE

New kilometers in Swedish electrical power network



Elnos Grupa potvrdila izuzetnu spremnost za izazove i realizovala četiri projekta u Švedskoj po najvećim evropskim i svjetskim standardima

Elnos Group confirmed its readiness for challenges and performed four projects in Sweden at highest European and world standards



SR Ucrtali smo nove stotine kilometara dalekovoda u energetske mreži Švedske. Godina 2015. bila je izuzetno uspješna na ovom dijelu tržišta, na kome smo potvrdili i unaprijedili saradnju sa vodećim energetske kompanijama.

Na brojnim trasama naponskih nivoa od 130 do 400 kV savladali smo mnoge profesionalne izazove i potvrdili spremnost za realizaciju projekata po najvećim evropskim i svjetskim standardima.

Oštra švedska zima dočekala nas je hladnog lica već na prvom projektu 2015. godine. Radili smo za svjetski poznatu kompaniju Svenska Kraftnat elektromontažne radove na DV 400 kV Hjalta–Vittersjo. Nismo se borili samo sa zimom i obilnim snjegovima. Teren je bio veoma brdovit, sa malo prilaznih puteva i nepristupačan. Na ovom dalekovodu stubovi su portalni sa dva špica. Na jedan špic instalirali smo

OPGW 142 mm² dužine 130 km, a na drugi špic 130 km novog čelika tipa Doterell, takođe 142 mm². Čak i u ovako otežanim uslovima, projekt je završen 12 dana prije roka, a od investitora smo dobili sve pohvale za kvalitet i brzinu izvođenja radova.

Sljedeći posao, kompletnu elektroinstalaciju na novom dalekovodu 130 kV Korsberga–TS Tappan, radili smo takođe za svjetski poznatu kompaniju Vattenfall. Na trasi dugoj 25 kilometara uradili smo podizanje stubova i elektromontažne radove. Na ovom poslu nas je pratilo mnogo ljepše vrijeme. Na ruku nam je išao i teren koji je prilično ravan. Slobodno možemo reći da je ovo tip posla koji je naša specijalnost. To smo i dokazali, završivši projekat skoro mjesec dana prije ugovorenog roka.

Sredinom godine, novi posao nas odvodi na sjever Švedske, u dio koji je u neposrednoj blizini granice sa Finskom. Naš angažman bio je

u vezi sa izgradnjom još jednog novog dalekovoda 130 kV Djuptjarn–Nederkalix. U ovoj oblasti gradila se nova trafostanica, a Elnos Grupa je u sklopu tog posla uradila kompletne elektroinstalacije vezane za dalekovode. Montirali smo i podigli 11 čeličnih stubova, šest zateznih i pet nosnih, provodnici su bili sa dva vodiča u snopu 2x910 mm². Na ovom projektu smo imali paralelne vodove. Morali smo koristiti veći broj uzemljenja, i mašinskih i radnih. Zabilježili smo indukcionni napon i do 800 volti.

Ljeto i jesen donijeli su nove profesionalne izazove na jugu Švedske, u pokrajini Skåne. Elnos Grupa je krajem oktobra realizovala projekat zamjene postojećeg zaštitnog užeta OPWG-om na dva dalekovoda 130 kV Lärkeröd–Mörarp i 2x130 kV Mörarp–Landskrona, za investitore Tele 2 i E.ON Elnät Severige AB. Realizacija ovog projekta bila je veoma specifična. Trasa ovih dalekovoda je bila izuzetno

zahtjevana, sa brojnim ukrštanjima, postojećim dalekovodima, lokalnim i magistralnim saobraćajnicama, auto-putevima i željeznicom, jer je prolazila kroz brojna naseljena mjesta. Posebno je zanimljivo to što su naši monter i radove na oba dalekovoda izveli uz upotrebu najsavremenije tehnologije, tj. robota. Robot, tzv. 'cable cat', instalirao je zaštitu na dijelovima trase iznad ukrštanja. Na ovaj način ostvaren je konstantan i najviši nivo zaštite radnika i svih učesnika saobraćaja i prostora koji se štiti. Prilikom izvođenja radova angažovane su specijalističke firme za postavljanje signalizacije i znakova upozorenja za bezbjedno odvijanje saobraćaja na auto-putevima. Za ovaj veoma komplikovan dio posla koji podliježe specifičnim pravilima, angažovali smo podizvođače koji su za obezbjeđenje puta i signalizaciju koristili šest specijalnih kamiona. Investitori su izuzetno zadovoljni izvedenim radovima, a nakon finalnih inspekcija nije bilo niti jedne primjedbe.

EN We marked new hundreds of kilometers of transmission lines in Swedish electrical power network. Year 2015 was extremely successful in this part of market, where we confirmed and improved cooperation with leading electrical power companies.

In numerous cable routes of voltage levels of 130 to 400 kV we overcame many professional challenges and confirmed readiness for projects realization at highest European and world standards.

Harsh Swedish winter waited for us at the first project in 2015. We worked for the world

recognized company Svenska Kraftnat and performed electrical assembly works on TL 400 kV Hjalta-Vittersjo. We did not fight only winter and big snow. Terrain was very hilly, with small number of access roads and inaccessible. This transmission line had portal tower with two peaks. OPGW 142 mm² 130 km long was installed on one peak, and 130 km of new steel type Doterell, again 142 mm², was installed on the other peak. Even in conditions as difficult as these, project was completed 12 days before deadline, and the Investor praised us for work performance quality and speed.

Next project, entire electrical installation of the new 130 kV transmission line Korsberga-SS Tappan, was also performed for another world famous company Vattenfall. In cable routes 25 kilometers long, we erected towers and performed electrical assembly works. We had a significantly better weather conditions in this project. We also had rather flat terrain. We can freely say that this is a type of project that is our specialty. We proved it by completing the project nearly a month before contracted deadline.

At mid-year, new project leads us to the North part of Sweden, in a part which is directly in contact with the Finish border. We were engaged for construction of another new 130 kV transmission line Djuptjarn-Nederkalix. In this area, there was a new substation built and Elnos Group set up entire electrical installations referring to transmission lines within this project. We assembled and erected 11 steel towers, six tension towers and five support towers. Wires were two guides in bundles

2x910 mm². We had parallel ducts in this project. We had to use larger number of earthing, mechanical and operational. We noted induction voltage up to 800 volts.

Summer and autumn brought new professional challenges in the South of Sweden, in province Skåne. At the end of October, Elnos Group performed project of replacing existing protection rope with OPWG in two TL 130 kV Lärkeröd-Mörarp and 2x130 kV Mörarp-Landskrona, for Investors Tele 2 and E.ON Elnät Severige AB. This project performance was a very specific one. Route of these transmission lines was extremely demanding, with numerous crossings with existing transmission lines, local roads and motorways, highways and railways since it went through numerous settlements. It was especially interesting that our fitters performed works on both transmission lines using state-of-art technology, i.e. robot. Robot, so called 'cable cat', installed protection on route parts above crossings. In this way, a constant and highest level of protection of employees was achieved as well as all participants in the traffic and space being protected. During works performance, specialist companies were hired to set up signalization and warning signs for safe traffic flow on the highways. For this very complicated part of project, which is subject to specific regulations, we hired subcontractors, who used six special trucks for road safety and signalization. Investors are extremely satisfied by works performed, and after final inspections, there were no remarks reported whatsoever.

NAJSAVREMENIJA OPREMA

ELNOS GRUPA JE JEDNA OD RIJETKIH KOMPANIJA NA BALKANU KOJA RASPOLAŽE 'CABEL CAT'-OM. OVAJ ROBOT DONOSI VIŠESTRUKI KORISTI: UBRZAVA REALIZACIJU POSLA DVA DO TRI PUTA, SAMIM TIM SMANJUJU TROŠKOVE, MNOGO JE SIGURNIJI ZA RADNIKE I PROSTOR KOJI SE POMOĆU NJEGA ŠTITI.

STATE-OF-ART EQUIPMENT

ELNOS GROUP IS ONE OF RARE COMPANIES IN BALKANS THAT HAS 'CABLE CAT' ON ITS DISPOSAL. THIS ROBOT PROVIDES MULTIPLE BENEFITS: IT SPEEDS UP PROJECT REALIZATION FOR TWO OR THREE TIMES, HENCE DECREASES COSTS, IT IS MUCH SAFER FOR EMPLOYEES AND SPACE BEING PROTECTED.



DV 2x130 kV Mörarp-Landskrona / TL 2x130 kV Mörarp-Landskrona



Mapa nove optičke mreže u Crnoj Gori / Map of new optical network in Montenegro

IZGRADNJA NAJSAVREMENIJE OPTIČKE MREŽE

Construction of the most modern optical network

Elnos Grupa u najvećem projektu izgradnje telekomunikacione infrastrukture u Crnoj Gori uspješno polaže ispit za ispitom u ekstremno teškim uslovima za rad

Elnos Group successfully passes exam after exam in extremely difficult working conditions in the largest project of constructing telecommunication infrastructure in Montenegro

SR Razvoj telekomunikacione infrastrukture, koja će svim domaćinstvima Crne Gore omogućiti najbolje usluge zasnovane na korištenju optičkog interneta, jedan je od najvećih i najzahtjevnijih projekata u kojima trenutno učestvujemo. To je projekat izgradnje OPGW i ADSS kablovske mreže koji se realizuje na infrastrukturi Elektroprivrede Crne Gore.

Ovim projektom obuhvaćena je ogromna oblast, i to kompletno primorje od Igala do Ulcinja, oblast Podgorice i sjever Crne Gore. Elnos Grupa će u toj oblasti uraditi elektromontažne radove na 46 dalekovoda. Od toga su 44 dalekovoda nazivnog napona 35 kV, na kojima je predviđeno postavljanje OPGW zaštitnog užeta sa 48 vlakana, dok će se na preostala dva 10 kV

dalekovoda postaviti ADSS optički kabl. Ukupna dužina svih dionica je 322,4 km.

Investitor je M:tel Crna Gora, čiji je izvršni direktor Vladimir Lučić istakao da je ova kompanija pokrenula najveću investiciju u telekomunikacionu infrastrukturu u Crnoj Gori od 2007. godine, kada je ušla na tržište. „Razvoj dobre internet infrastrukture je jedna od osnova budućeg razvoja svakog društva. Do kraja ovog projekta, koji će trajati tri godine, planiramo da pokrijemo sva prigradska naselja signalom. Napominjemo da radimo najsavremeniju optičku mrežu koja garantuje brz i kvalitetan internet“, rekao je Lučić.

Za svaku od ugovorenih 46 trasa naš dio posla obuhvata izradu projektnog dokumen-

tacije, nabavku i ugradnju opreme. Radimo glavne projekte adaptacije dalekovoda. Za njihovu izradu su potrebna geodetska snimanja trase, stubova i ugiba provodnika, za šta u većini slučajeva koristimo avionsko snimanje. Pored nabavke OPGW-a sa pripadajućom opremom, u zavisnosti od potrebe za ojačavanjem stubova isporučujemo i ugrađujemo vruće pocinčane metalne konstrukcije.

Realizaciju projekta na terenu mogli bismo uporediti sa svakodnevnim polaganjem vrlo zahtjevnih ispita, jer su uslovi za rad i teren izuzetno teški. Jedan od projekat menadžera Danijel Kontić, ističe: "Što se tiče specifičnosti projekta, to je teren. Radili smo od TS Kotor do TS Lovćen, gdje su ogromni usponi i gdje nema pristupa stubnim mjestima. Na ovom dalekovodu dužina trase je 5,8 km, ali je početna tačka na 20 m, a krajnja na 1.710 m nadmorske visine. Dešavalo se da radnicima treba tri sata pješke samo da dođu do lokacije stuba. Onda, specifični vremenski uslovi. U Kotoru je prijatno vrijeme, na Lovćenu pada snijeg, a ekipa radi istovremeno".

Generalno, trase su dosta zahtjevne jer se radi o krševitom terenu, naročito u primorju. Sada, tokom ljetnih mjeseci, radnici se bore i sa izuzetno visokim temperaturama.

Ovaj projekat se radi na infrastrukturi Elektroprivreda Crne Gore (EPCG). Njegovom realizacijom M:tel kao investitor dobija pouzdanu telekomunikacionu mrežu sa velikim kapacitetom i mogućnostima, a i EPCG će ostvariti veliki benefit. Postavljanjem OPGW-a poboljšava se pouzdanost dalekovoda i dobija mogućnost povezivanja trafostanica, prvenstveno 35 kV napona, u SCADA sistem sa svim prednostima i mogućnostima koje ovaj sistem nudi.

U realizaciji dijela kapitalnog projekta M:tel-a učestvuju članice Elnos Grupe iz Crne Gore, Srbije i BiH. Okvirni ugovor potpisan je sredinom 2015, a četiri aneksa sukcesivno u narednih šest mjeseci. U ovom dugoročnom projektu ugovorne obaveze ostvarujemo prema planiranoj dinamici, očekujući da ćemo ispiti u narednom periodu položiti sa istim uspjehom.

EN Development of telecommunication infrastructure, which is going to provide all homes in Montenegro with the best service based on use of optical internet, is one of the biggest and most demanding projects we are taking part in at the moment. We are talking about project of constructing OPGW and ADSS cable network realized on infrastructure by company Elektroprivreda Crne Gore.

This project covers large area, entire seaside from Igalo to Ulcinj, Podgorica area and Northern part of Montenegro. Elnos Group

shall perform electrical assembly works of 46 transmission lines in this area. Out of these, 44 transmission lines have 35 kV nominal voltage where OPGW protective rope with 48 fibers installation is planned. ADSS optical cable shall be installed on the two remaining 10 kV transmission lines. Total length of all sections is 322.4 km.

Investor is M:tel Montenegro, whose Executive Director, Vladimir Lučić, said that this company had started the biggest investment in telecommunication infrastructure in Montenegro since 2007, when it had appeared on this market. "Development of good internet infrastructure is one of the bases of future development of any society. By the end of this project, which is going to last for three years, we plan to cover all suburban locations by signal. We would like to stress we are installing the state-of-art optical network, which guarantees fast internet and internet of good quality", said Lučić.

In each of contracted 46 routes, our part of work includes making of designing documentation, purchase and installation of equipment. We make final design for transmission lines adaptation. In order to make these, we need to perform survey of the routes, poles and dips, and we mostly use airborne survey. Apart from purchasing OPGW with accessory equipment, depending on need for strengthening of the poles, we deliver and install hot galvanized metal constructions.

Realization of the project on the field could be compared with everyday taking of very demanding exams, since working conditions and terrain are difficult. Danijel Kontić, one of

the Project Managers, stresses: "As for specific feature of the project, it is terrain. We worked from SS Kotor to SS Lovćen, where there are enormous climbs and there is no access to pole locations. In this transmission line, route is 5.8 km long, but starting point is at 20 m, and final at 1,710 m height. There were situations when workers needed three hours on foot to get to the pole location itself. There are specific weather conditions, too. It is pleasant in Kotor, snowing at Lovćen and the team is working simultaneously".

Generally, routes are very demanding since this is karst area, especially at the seaside. Now, in summertime, workers fight with extremely high temperatures.

This project is realized on infrastructure by company Elektroprivreda Crne Gore (EPCG). By its realization, M:tel, being the Investor, is provided with reliable telecommunication network with big capacity and possibilities and EPCG is going to have benefits. Installation of OPGW improves reliability of the transmission line and is provided with possibility to connect substations, 35 kV voltage in the first place, to SCADA system with all benefits and capacities offered by this system.

Members of Elnos Group from Montenegro, Serbia and BiH take part in realization of a part of the M:tel main project. Frame agreement was signed mid-2015, and four annexes succeeded in the following six months. In this long-term project, we perform contractual liabilities in line with planned time schedule and we expect we are going to pass the upcoming exams with the same marks.



Radovi u krševitom terenu / Works in karst area

Bitka sa NAJSUROVIJOM PRIRODOM

Fighting the harshest nature



Bokotorski zaliv / Bay of Kotor

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Elnos Grupa okončala jedan od najizazovnijih energetske projekata, izgradnju dalekovoda za vrijeme čije realizacije je nemilosrdna priroda svaki dan pred radnike postavljala novu prepreku

Elnos Group completed one of the most challenging electrical power projects – construction of transmission line where harsh nature set a new barrier for the work performers every day

SR Uolikoj mjeri je Elnos Grupa spremna pomjeriti granice mogućnosti obavljanja radova u najekstremnijim geografskim uslovima, možda najbolje ilustruje projekat izgradnje 110 kV dalekovoda Tivat-Kotor.

Suočivši se sa ovim zadatkom, Elnos Grupa se našla pred dva velika izazova. S jedne strane je bilo potrebno dokazati sposobnost objedinjenja svih faza ovog posla, od projektovanja do fizičke realizacije, dok se s druge trebalo suočiti sa izuzetno nepristupačnim geografskim terenom.

Zahvaljujući realizaciji ovog projekta, u velikoj mjeri će se poboljšati snabdijevanje i povećati pouzdanost napajanja područja Kotora električnom energijom, čime se ujedno stvaraju

uslovi za razvoj turizma u ovom dijelu crnogorskog primorja.

Investitor projekta je Crnogorski elektroprivredni sistem, a glavni ugovarač radova je članica Elnos Grupe iz Podgorice Elnos inženjering. U ovaj poslovni poduhvat uključene su članice Elnos grupacije iz Srbije, Crne Gore i BiH.

Realizacija projekta počela je izradom tehničke dokumentacije na osnovu idejnog projekta investitora. Prvi iskopi temeljnih jama urađeni su u novembru prošle godine, dok su radovi na elektromontaži provodnika započeti krajem aprila ove godine.

Inače, ovaj posao realizovan je po principu 'ključ u ruke', u ugovorenom roku od 18 mjeseci.

Na izgradnji dalekovoda Tivat–Kotor, naši radnici su se svakodnevno suočavali sa uslovima koji su na samoj granici mogućeg. Radi se o tome da trasa dalekovoda Tivat–Kotor jednim svojim dijelom prolazi strmim kamenim terenom, tako da su iskopi temeljnih jama na ovom dijelu trase izvedeni uz korištenje minsko-eksplozivnih sredstava. Na nekim dionicama teren je bio u tolikoj mjeri nepristupačan, da su za transport mehanizacije morali biti korišteni konji. U jednom trenutku izvođenja radova okolnosti su se u tolikoj mjeri pogoršale, da je na jedno stubno mjesto dio čelično–rešetkaste konstrukcije morao biti iznošen ručno.

Zajedno sa 'strmom' geografijom crnogorskog podneblja, u vidu otežavajućih okolnosti izvođenju radova, udružile su se i loše meteorološke prilike, jer su radovi počeli u novembru, što je početak kišnog perioda na primorju. Svaki dan kiše značio je dodatni dan pauze, jer su u takvim okolnostima staze za konje bile klizave i opasne za rad.

Kada govorimo o tehničkim detaljima projekta, važno je naglasiti da ovaj dalekovod povezuje trafostanicu 110/35 kV Tivat i trafostanicu 110/35/10 kV Kotor (Škaljari). Dalekovod je jednim dijelom jednosistemski, drugim dvosistemski, dok u krajnjoj etapi koja vodi sve do trafostanice Škaljari, prelazi u podzemni vod. Ovaj dalekovod je ciljano projektovan tako da u budućnosti može prihvatiti dalekovod iz trafostanice 400 kV Lastva (Grbaljska), koja je u izgradnji, ka trafostanici Kotor (Škaljari).

EN Perhaps the best illustration of the Elnos Group's readiness to push boundaries of ability to perform the works in the most extreme geographical conditions is the project of constructing 110 kV Transmission line Tivat–Kotor.

Facing this task, the Elnos Group has faced two challenges. On the one hand, it was necessary to prove ability to comprise all the phases of this project, from designing to physical realization, whereas on the other hand we should face extremely inaccessible geographical terrain.

Thanks to realization of this project, supply of electrical power shall be improved largely and reliability of supply shall be increased in Kotor area, which, at the same time, creates conditions for development of tourism in this part of Montenegrin seaside.

Project Investor is the Electric Transmission System of Montenegro and the Main Contractor is a member of the Elnos Group from Podgorica - Elnos Engineering. This business endeavor includes members of the Elnos Group from Serbia, Montenegro and BiH.

Project realization started by making technical documentation based on Investor's designing project. The first excavations for foundations were made in November last year whereas works on electrical assembly of conductors started at the end of April this year.

Namely, this was contracted as turn-key project and contracted deadline for its performance is 18 months.

On daily basis, our employees faced conditions of the final frontier of their abilities in construction of Transmission line Tivat–Kotor. The thing is the section of the Transmission line Tivat–Kotor goes through a steep rocky terrain in one part so that excavations for foundations in this part have been performed by using mine-explosive devices. In some sections, terrain was so inaccessible that horses had to be used for transport of machines. At one point of work performance, conditions got worsened so much that one steel lattice tower had to be carried manually.

Bad weather conditions joined 'steep' Montenegrin geography aggravating work performance, since works started in November, which is rainy period at the seaside. Every rainy day was a day of delay, since, in such circumstances, horses paths were slippery and dangerous for work.

When talking about technical details of the project, it is important to mention that this transmission line connects substation 110/35 kV Tivat and substation 110/35/10 kV Kotor (Škaljari). In one part, transmission line is one-system and in another part it is two-system transmission line, whereas in the final stage leading up to substation Škaljari, it turns into underground line. This transmission line is designed on purpose so that in future it can include transmission line from substation 400 kV Lastva (Grbaljska), which is under construction for substation Kotor (Škaljari).



Dvostruki 110 kV stub visine 17,7 m
Double 110 kV pole 17.7 m high



Dalekovod 110 kV Tivat–Kotor
Transmission line 110 kV Tivat–Kotor

Savladani ekstremni uslovi rada

Extreme working conditions overcome



U veličanstvenoj Ovčarsko-kablarskoj klisuri, 110 dana je trajala prava borba sa prirodom, prilikom zamjene drvenih stubova iz 1954. godine, modernim čelično-rešetkastim stubovima

In the magnificent Ovčar-Kablar-canyon, there was a realistic fight with nature lasting for 110 days in order to replace wooden towers dating from 1954 by modern steel-lattice towers



Radovi u Ovčarsko-kablarskoj klisuri / Works in Ovčar-kablar canyon

SR U jednom od najljepših predjela Srbije, Ovčarsko-kablarskoj klisuri, realizovan je jedan od najekstremnijih projekata u kojima je učestvovala Elnos Grupa, izgradnja novog dalekovoda 35 kV Ovčar Banja-Međuvršje. Ovaj dalekovod je prvi energetski objekat te vrste izgrađen na području opštine Čačak u posljednjih 30 godina.

Prije rekonstrukcije, veza između HE Međuvršje i HE Ovčar Banja bila je ostvarena sa dva 35 kV dalekovoda, od kojih je jedan urađen na drvenim stubovima iz 1954. godine. Rekonstrukcija je povjerena Elnos Grupi, a mi smo realizovali plan ostvarivanja veze pomoću novoizgrađenog dvostrukog dalekovoda, koji je zamijenio dva postojeća.

Iako je dužina dalekovoda 4,6 kilometara, u veličanstvenoj Ovčarsko-kablarskoj klisuri 110 dana je trajala prava borba sa prirodom, prilikom zamjene starih drvenih stubova modernim čelično-rešetkastim, a starih bakarnih

provodnika lakšim, aluminijumskim. Razlog za to je što trasa dalekovoda jednim dijelom prolazi Ovčarsko-kablarskom klisurom, prelazi magistralni put Beograd-Užice i dva puta prelazi akumulaciono jezero HE Međuvršje. Ove strme klisure, litice i prelijepe stoljetne šume, donijele su nam niz specifičnosti u realizaciji projekta.

U ovom poduhvatu smjenjivali su se naši građevinski radnici i elektromonteri, radeći od sumraka do svitanja. Teren je bio nepristupačan i visokorizičan, pa su radnici bili pod punom opremom, kao alpinisti. Radovi nisu prekidani ni u teškim vremenskim uslovima, bilo da je plus 38°C na terenu punom otrovnih zmija, niti kada su monter i na stubovima bili izloženi udarima vjetra od 50 km/h.

Poseban profesionalni izazov predstavljao je transport materijala na teško pristupačna mjesta i miniranje terena za iskop temeljnih stopa stubova. Iako posjedujemo najsavre-

menije mašine, do sedam stubnih mjesta put je bio potpuno neprohodan. Stazu za pješake i konje su sopstvenim mišićima pravili naši podizvođači, čak 20 dana. Veliku spremnost i zalaganje dokazali su i građevinski radnici koji su oko 2 km pješačkih staza i podgrada uradili bez upotrebe mehanizacije, a ručno su napravili i ugradili 80 m³ betona.

Montirana su ukupno 23 stuba, od toga 14 nosećih i devet zateznih. Specifičnostima projekta nije bio kraj ni po završetku montaže stubova. Za sljedeću fazu radova prevlačenje konopa na nekim mjestima nije pomogao ni samostrel, pa su angažovani ekstremni sportisti.

Jedan dio trase prolazi neposredno iznad magistralnog puta za Jadransko more, kojim svakodnevno prođe više od 10.000 vozila. Zbog bezbjednosti saobraćaja, bilo je neophodno da prilaz stubnim mjestima, pješačke staze, kao i mjesta iskopa temeljnih jama obezbijedimo podgradama.

Uporedo sa radovima na terenu rađena je i izmjena dokumentacije, jer raspoloživom projektom dokumentacijom nisu bili predviđeni ekstremni terenski uslovi rada.

Investitor radova EPS, Ogranak Drinsko-limske elektrane, HE Elektromorava Čačak, izuzetno je zadovoljan realizovanim projektom. Izgradnjom ovog dalekovoda završena je treća faza projekta revitalizacije brana u Ovčar Banji i Međuvršju, čime je produžen vijek ovih hidroelektrana za četiri decenije, a njihova snaga povećana je za 25 odsto.

EN In one of the most beautiful regions in Serbia, Ovčar-Kablar canyon, one of the most extreme projects was performed. Elnos Group participated and a new 35 kV transmission line Ovčar Banja–Međuvršje was constructed. This transmission line is the first electrical energy facility of this kind built in the area of the Čačak municipality in the last 30 years.

Before reconstruction, connection between HPP Međuvršje and HPP Ovčar Banja was performed with two 35 kV transmission lines, out of which one was made by wooden towers from 1954. Reconstruction was entrusted with the Elnos Group, and we realized the plan of making connection with newly built double transmission line, which replaced the two existing ones.

Although the length of the transmission line

amounting to 4.6 kilometers, in the magnificent Ovčar-Kablar canyon, there was a realistic fight with nature lasting for 110 days in order to replace wooden towers by modern steel-lattice towers, and old copper conductors by aluminum, lighter ones. This is due to the fact that section in one of its parts goes through Ovčar-Kablar canyon, crossing over motorway Belgrade–Užice and twice crosses over accumulation lake of the HPP Međuvršje. These step canyons, scars and beautiful century old forests, brought a series of specific features in realization of the project.

In this endeavor, construction workers and electrical assembly workers got their turns and worked from dusk to dawn. Terrain was inaccessible and highly risky, so the worker had complete equipment as same as climbers. Works were not stopped even in difficult weather conditions, whether it was plus 38°C in the field full of vipers, or the assembly staff was exposed to the wind blows of 50 km/h on the towers.

A special professional challenge was transport of material to inaccessible locations and mining the field for excavation of tower foundations. Although we have the most modern machines, seven tower posts were completely inaccessible. Our subcontractors made walking and horse path by themselves for 20 days. Significant readiness and efforts were also

demonstrated by construction workers made 2 km of walking paths and supports without using machinery, and they made and installed 80 m³ of concrete manually.

23 towers were erected in total, out of which 14 are supporting and tension towers. After they completed assembly of the towers, more specific features of the project appeared. Crossbow was not helpful in setting the rope on some locations so extreme sportsmen had to be hired.

One part of the section is going directly over the motorway for the Adriatic Sea. On daily basis, more than 10,000 vehicles pass there. Due to traffic safety, it was necessary to secure access to towers locations, walking paths as well as excavation locations for foundations, by supports.

Change of documentation was performed alongside the field work since extreme field works were not planned in the available designing documentation.

EPS, Branch Office of Drina-Lim electrical power plant, HPP Elektromorava Čačak, the Investor, is extremely satisfied by work performance. By constructing this transmission line, the third phase of revitalization project for dams in Ovčar Banja and Međuvršje completed, which extended the life of these hydro power plants for the next four decades and their power was increased for 25 per cent.



Montaža stuba / Assembly of pole



Transport materijala / Transport of material

Učešće u izgradnji Koridora 10

Participation in construction of Corridor 10



Na dionici Prosek–Crvena Reka, Elnos Grupa izvršila izmještanje optičkih kablova u okviru lota 1 Prosek–tunnel Bančarevo. Radilo se noću kada je saobraćaj slabijeg intenziteta

Elnos Group relocated optical cables of the route Prosek–Crvena Reka in the frame of Lot 1 Prosek–Tunnel Bančarevo. We worked at night, when traffic intensity is decreased

SR Elnos Grupa jedan je od brojnih izvođača koji učestvuju u izgradnji Koridora 10, jednog od najvažnijih panevropskih saobraćajnih koridora koji prolazi kroz Srbiju i povezuje Austriju, Mađarsku, Sloveniju, Hrvatsku, Srbiju, Bugarsku, Makedoniju i Grčku. Projekat u kome smo učestvovali je projekat Istok E–80 koji obuhvata izgradnju auto-puta od Niša do granice sa Bugarskom.

Preciznije, na dionici Prosek–Crvena Reka izvršili smo izmještanje optičkih kablova u okviru lota 1 Prosek–tunnel Bančarevo. Projekat je obuhvatao izmještanje ukupno 4,5 km optičkog kabla, odnosno dva kabla od kojih je jedan sa 144 optička vlakna, a drugi sa 24 optička vlakna. Izmještanje kablova rađeno je na međunarodnom koridoru prema Bugarskoj, kojim Dojče Telekom obezbjeđuje internet konekciju prema istočnoj Evropi i Bliskom istoku. Ovo nam je otežavalo rad, jer su se predikci i prevezivanja najavljalivali i usaglašavali na međunarodnom nivou 20 dana prije plani-

rane operacije. Još jedna otežavajuća okolnost je što se radilo noću kada je saobraćaj slabijeg intenziteta.

Investitor projekta su Koridori Srbije, a Elnos Grupa radila je u konzorcijumu sa kompanijom TELEFONKABL a.d. Radovi su završeni prema planiranoj dinamici u četiri faze po 60 dana, uz poštovanje svih zahtjeva struke.

EN Elnos Group is one of many contractors participating in construction of Corridor 10, one of the most important pan-European transport corridors going through Serbia and connecting Austria, Hungary, Slovenia, Croatia, Serbia, Bulgaria, FYR Macedonia and Greece. Project we took part in is the project East E–80, which covers construction of highway from Niš to boundary with Bulgaria.

To be more precise, we relocated optical cables of the route Prosek–Crvena Reka in

the frame of Lot 1 Prosek–Tunnel Bančarevo. Project covered relocation of 4.5 km of optical cable in total, i.e. two cable, out of which one has 144 optical fibers and the other one has 24 optical fibers. Relocation of cables was performed at the international corridor towards Bulgaria, where Deutsche Telekom provides internet connection towards Eastern Europe and Middle East. This aggravated our work since interruptions and re-connections were announced and harmonized at international level 20 days prior to planned activity. Another aggravated circumstance was night work when traffic intensity was decreased.

Project Investors is company Koridori Srbije, and Elnos Group was a part of consortium with company TELEFONKABL a.d. Works were completed in line with planned time schedule in four stages with 60 days and we obeyed all the professional requests.



Izmještanje optičkih kablova / Relocation of optical cables

Uvedeni novi dalekovodi u TS Beograd 20

New transmission lines introduced in SS Beograd 20



Novi dalekovod 400 kV / New transmission line 400 kV

**Radnici Elnos Grupe u uslovima
guste naseljenosti uspješno obavili
elektromontažne radove u okviru
poduhvata izgradnje dva dalekovoda
nazivnog napona 400 kV**

Employees of the Elnos Group successfully performed electrical assembly works in conditions of high population within the frame of undertaking construction of two transmission lines of nominal voltage 400 kV

SR Jedan od najboljih primjera kojim smo pokazali da komplikovanost izvođenja radova u uslovima guste naseljenosti ne mora biti prepreka kvalitetnom i preciznom obavljanju posla predstavlja naše učešće u projektu izgradnje i uvođenja dva nova dalekovoda u trafostanicu 400/110 kV Beograd 20.

Elnos Grupa je u okviru projekta, čiji je glavni investitor JP Elektromreža Srbije, a glavni ugovarač kompanija Energoprojekt oprema, uspješno obavila podizvođačke radove.

Posao kojeg smo se prihvatili je podrazumijevao izgradnju dva paralelna dalekovoda naponskog nivoa 400 kV na čelično-rešetkastim stubovima tipa "Y". Prilikom izgradnje ova dva dalekovoda postavljeno je 59 novih stubova na dionici od 18 kilometara. Cilj izgradnje dalekovoda je omogućavanje povezivanja trafostanice Beograd 20 sa postojećim 400 kV

dalekovodom koji povezuje TS Beograd 8 sa TS Pančevo 2.

Zadatak radnika Elnos Grupe na ovom zahtjevnom projektu je bio izvođenje elektromontažnih radova koji su podrazumijevali montažu izolatorskih lanaca, kompletno razvlačenje novog provodnika na oba dalekovoda, njihovo spajanje sa postojećim dalekovodom, zatim montažu prigušivača vibracija za provodnik i rastojnika.

Zanimljivo je da su radovi na izgradnji dalekovoda za TS Beograd 20 nosili pečat posebnog značaja i specifičnosti uslova rada. Prvi je taj što nova TS Beograd 20 ima nacionalni značaj, jer osigurava uredno snabdijevanje Beograda električnom energijom i predstavlja veoma značajnu kariku u stabilnosti elektroenergetskog sistema Srbije. Pored toga, TS Beograd 20 je sastavni dio buduće Transbalkanske magi-

strale za prenos električne energije.

Druga specifičnost je bila u direktnoj vezi sa uslovima rada montera na terenu, jer veći dio trase ovog dalekovoda prelazi preko naseljenih mjesta, što su uslovi koji zahtijevaju visok stepen pažnje i profesionalizma u radu.

Elektromontažni radovi na ovom projektu za naše operativce na terenu podrazumijevali su ručno razvlačenje radnog kanapa duž cijele trase. To znači da su monter morali vući kanap kroz dvorišta, odnosno privatne posjede građana, a zbog njihovog protivljenja ovakvom načinu rada, monter je svakodnevno obezbjeđivala policija.

Uprkos ovako visokotenzionim i komplikovanim uslovima rada, zahvaljujući trudu i profesionalizmu radnika, kompletan posao je obavljen tako da imovina građana ni u jednom slučaju nije oštećena, a radovi su okončani u ugovorenom roku od 85 dana.

EN One of the best examples, which showed that complexity of works performance in condition of high population does not have to be an obstacle to quality and detailed work performance, is our participation in project of construction and introduction of two new transmission lines in

the substation 400/110 kV Beograd 20.

Elnos Group has successfully performed subcontracting works within the project, whose Main Investor is PC Elektromreža Srbije and the Main Contractor is the company Energo-projekt oprema.

The works undertaken referred to construction of two parallel transmission lines of voltage level 400 kV on the steel-lattice towers type "Y". While constructing these two transmission lines, 59 new poles were set in the section 18 kilometers long. The aim of the transmission lines construction is to enable connection between Substation Beograd 20 with the existing 400 kV transmission line, which connects SS Beograd 8 with SS Pančevo 2.

In this demanding project, the Elnos Group employees were tasked with performance of electrical assembly, which included installation of insulation chains, entire new ducting for both transmission lines, their connection to the existing transmission line and assembly of vibration suppressors for duct and spacers.

It is interesting to mention that construction works of SS Beograd 20 were marked as of special importance and with specific working conditions. The first is that the new SS Beograd 20

has a national meaning, since it provides regular electrical power supply for Belgrade and represents a very important link in stability of electric power system of Serbia. Apart from this, SS Beograd 20 is a constituent part of the future Trans-Balkan Highway for transmission of the electrical power.

The second specific feature was directly referring to working conditions of assembly workers in field, since the leading part of this transmission line section goes over inhabited locations, which are conditions requiring high level of attention and professionalism in work.

As for our employees in the field, electrical assembly works of this project meant manual distribution of work rope along entire section. This means that assembly workers also had to drag rope through yards and other private people's facilities. Due to opposition of people for this type of work, they were secured by the police officers on daily basis.

In spite of these highly tension and complicated work conditions, thanks to efforts and professionalism of the employees, entire work was performed in the way that no people's property was damaged at all, whereas work completed in contracted period of 85 days.



Izmještanje dalekovoda Grdelica-Predejane

Relocation of transmission line Grdelica-Predejane

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„Koridori Srbije“ angažovali Elnos Grupu za dio posla u okviru projekta izmještanja 35 kV dalekovoda

„Koridori Srbije“ hired Elnos Group for a part of work in the frame of the project of relocating 35 kV transmission line



Radovi na DV 35 kV Grdelica-Predejane / Works on TL 35 kV Grdelica-Predejane

SR Jedan od nepristupačnih i živopisnih predjela Srbije, područje Grdeličke klisure i doline Južne Morave se kroz novu investiciju preduzeća „Koridori Srbije“ priprema za izgradnju nove dionice auto-puta E-75.

Izgradnja novog dijela auto-puta je nametnula potrebu izmještanja cjelokupne trase 35 kV dalekovoda Grdelica-Predejane.

Kompanija „Koridori Srbije“, kao investitor ovog projekta, je kao glavnog ugovarača za ovaj posao odredila kompaniju AZVI SA. Posao Elnos Grupe, kao podizvođača na ovom projektu, podrazumijeva izgradnju 29 stubova čelične konstrukcije, 15 nosećih i 14 ugaono-zatezanih.

Važno je naglasiti da je dalekovod Grdelica-Predejane od izuzetno velikog značaja za varošicu Predejane, jer on predstavlja jedini napojni vod za nju.

Dejan Maljenović, inženjer Elnos Grupe angažovan na ovom projektu kaže da je za kompaniju na ovom terenu poseban profesionalni izazov predstavljalo to što su radovi

često izvođeni u teškim uslovima. „Otežavajuća okolnost kod izvođenja ovog posla je izuzetno nepristupačan teren, kao i teški vremenski uslovi koji su nas pratili. Ipak, naši radnici su navikli na otežane uslove rada, tako da će suštinski ispunjenje rokova u vezi sa ovim poslom biti u vezi sa ispunjenjem rokova na izgradnji auto-puta“, rekao je on.

EN „Koridori Srbije“ hired Elnos Group for a part of work in the frame of the project of relocating 35 kV transmission line.

One of the inaccessible and picturesque regions in Serbia, area of Grdelička klisura (canyon) and valley of the River Južna Morava are being prepared for construction of new section of the highway E-75 through investment of company „Koridori Srbije“.

Construction of the new part of the highway imposed need for relocation of whole section of 35 kV transmission line Grdelica-Predejane.

Company „Koridori Srbije“, being the Inves-

tor of this project, appointed company AZVI SA as the Main Contractor for this project. Works of the Elnos Group, being subcontractor in this project, includes construction of 29 steel lattice towers, 15 supporting and 14 angle-tension towers.

It is important to emphasize that transmission line Grdelica-Predejane is extremely important for small town Predejane, since it is the only power duct for the town.

Dejan Maljenović, an Engineer of the Elnos Group engaged in this project, says the company was challenged with special professional project of work performance in difficult conditions on this terrain. „Aggravating circumstance in this work performance is very inaccessible terrain as well as difficult weather conditions we have been followed by. However, our employees are accustomed to difficult work conditions, so, essentially, meeting deadlines in this project will be in relation with meeting deadlines of the highway construction“, said Maljenović.



Dalekovodnu mrežu dovodimo u sve bolju formu

We put transmission line network in even better shape



Uspješno smo revitalizovali dalekovode na potezu Mrkonjić Grad–Šipovo, zatim Jajce 1–HE Bočac, Bočac–Banjaluka 1 i Banjaluka 1–Banjaluka 6/II

We successfully revitalized transmission lines in the section Mrkonjić Grad–Šipovo, as well as Jajce 1–HPP Bočac, Bočac–Banjaluka 1 and Banjaluka 1–Banjaluka 6/II

SR Elnos Grupa je tokom prošle i ove godine u kontinuitetu realizovala niz projekata rekonstrukcije dalekovodne mreže za svog dugogodišnjeg partnera, kompaniju Elektroprenos BiH.

Među poslovima koje nam je, kao lideru u okviru konzorcijuma Elektroenergetika, Elektroprenos BiH povjerio u prethodnoj godini, možemo sa ponosom istaći posao rekonstrukcije dalekovoda 35/110 kV Mrkonjić Grad–Šipovo.

Ovaj posao je podrazumijevao rekonstrukciju dva dijela starih dalekovoda, jednog na potezu Mrkonjić Grad–Jezero, a drugog na potezu Jezero–Šipovo. Cilj izvođenja ovog posla

je bio da se ova dva dalekovoda, koji su radili kao 35 kV spoje, te da nakon izgradnje nove trafostanice 110/x kV u Šipovu, počnu raditi pod naponom od 110 kV.

Zanimljivo je da je rekonstrukcija i omogućavanje rada ovih dalekovoda pod naponom od 110 kV bilo predviđeno prije posljednjeg rata (1991-1995). Međutim, rat je naglo prekinuo ove planove, dio teritorije dalekovoda ostao je u Federaciji BiH, a dva navedena dalekovoda ostala su da rade prespojena i pod naponom od 35 kV, u vlasništvu Elektrokrajine.

Ipak, godinama kasnije i proširenjem konzuma u Šipovu, opet su stvoreni uslovi za izgradnju nove trafostanice koja će napajati

ovaj gradić iz trafostanice 110 kV. Sada, kada smo obavili posao rekonstrukcije starih dalekovoda, njima je suštinski vraćena njihova prvobitna namjena, te su stvoreni preduslovi da na njih bude spojena nova trafostanica u Šipovu. Obavljanjem posla rekonstrukcije ova dva dalekovoda povećani su kapacitet i stabilnost energetske infrastrukture, koji će doprinijeti razvoju opštine Šipovo, ali i Mrkonjić Grad, kojoj će u perspektivi ova dalekovodna mreža biti potrebna zbog priključenja kapaciteta mini-hidroelektrana na njenom području.

Za kompaniju Elektroprenos BiH, a kao dio konzorcijuma Elektroenergetika smo učestvovali na projektu rekonstrukcije dalekovoda 2x110 kV HE Jajce 1-HE Bočac, dalekovoda 2x110 kV HE Bočac-Banjalučka 1 i dalekovoda 2x110 kV Banjaluka 1-Banjalučka 6/II.

Elnos BL Banjaluka je u okviru ovog projekta obavio kompletne elektromontažne radove na zamjeni izolacije i strujnih mostova.

Ovaj projekat podrazumijeva rad na dalekovodima koji su povezani sa dvije hidroelektrane i dalekovodima koji su izdijeljeni na više dionica. Posao se obavlja po sekcijama i to tako da se sljedeća sekcija ne može počinjati dok se ne završi prethodna. Zbog komplikovanosti same trase i sekcionisanja, radnici moraju striktno poštovati dinamički plan. Radi se o poslu koji je pred našu operativu postavio zahtjev brzine i stoođstotne preciznosti.

Cilj izvršenja rekonstrukcije ovih dalekovoda je obezbjeđivanje stabilnog elektroenergetskog sistema.

Za kompaniju Elektroprenos BiH smo tokom prošle godine obavili i posao zamjene izolacije na dalekovodu 220 kV Kakanj-trafostanica Prijedor 2, na njegovom dijelu koji prolazi kroz Republiku Srpsku. Dužina trase na ovoj dionici je 74 km, a izolacija je zamijenjena na 249 stuba.

EN During this year and in the previous year, the Elnos Group continuously realized a series of reconstruction projects for transmission line network on behalf of its long-term partner, company Elektroprenos BiH.

Among works assigned to us, as a leader of the joint venture Elektroenergetika, by Elektroprenos BiH in the past year, we proudly mention the works on reconstruction of 35/110 kV transmission line Mrkonjić Grad-Šipovo.

This project also included reconstruction of two parts of old transmission lines, one in the section Mrkonjić Grad-Jezero, and the other one in the section Jezero-Šipovo. The aim of this project was to join these two transmission lines, which worked as 35 kV, and, after building a new 110/x kV substation in Šipovo,



DV 2x110 kV HE Jajce 1-HE Bočac / TL 2x110 kV HPP Jajce 1-HPP Bočac

for them to start working under 110 kV voltage.

It is interesting to mention that reconstruction and operation of these 110 kV transmission lines was planned before the recent war (1991-1995). However, the war suddenly stopped these plans. A part of territory of the transmission lines stayed in BiH Federation and two mentioned transmission lines remained reconnected and under 35 kV voltage as the property of company Elektrokrajina.

However, years after that and increased number of users in Šipovo, conditions for construction of the new substation were created again. It should supply this small town from a 110 kV substation. Now that we did reconstruction of old transmission lines, they were essentially reassigned their original purpose. It created preconditions for them to be connected to the new substation in Šipovo. By reconstructing these two transmission lines, electrical power infrastructure capacity and stability increased. This is a contribution to development of Šipovo municipality, as well as Mrkonjić Grad, and this transmission line will be necessary in the future for its connection to the capacity of the mini hydro power plants in this area.

Being a member of joint venture Elektroen-

ergetika, we took part in the project of reconstructing 2x110 kV transmission line of the HPP Jajce 1-HE Bočac, 2x110 kV transmission line of the HPP Bočac-Banjalučka 1 and 2x110 kV transmission line of the Banjaluka 1-Banjalučka 6/II for the company Elektroprenos BiH.

Elnos BL Banjaluka performed all electrical assembly works for replacement of insulation and power bridges in the frame of this project.

This project includes work on transmission lines connected to two hydro power plants and transmission lines divided to several sections. Work is done in phases – the next section is not to be started before the current is done. Due to complexity of the section itself and work phases, workers are to obey the timeline strictly. This project demands speed and 100% precision from our employees.

The aim of reconstructing these transmission lines is provision of reliable and stable electrical power system.

In the previous year, we replaced insulation of the 220 kV transmission line Kakanj-substation Prijedor 2, on its part going through the Republic of Srpska, for the company Elektroprenos BiH. Section is 74 km long in this part, and insulation was replaced in 249 towers.

Izgrađen dalekovod 110 kV Kotor Varoš–Ukrina

Transmission line 110 kV Kotor Varoš–Ukrina constructed



Priliku da pokaže profesionalnost i znanje dobila jedna od mlađih ekipa iz divizije za dalekovode i zabilježila poduhvat. Manuelno podignuto i montirano 46 željezno-rešetkastih stubova

The youngest team of the transmission line division got a chance to show their professionalism and knowledge on this transmission line and notes an endeavor. 46 iron-lattice tower erected and assembled manually



SR Konzorcijum Elektroenergetika, u okviru koga je lider kompanija Elnos BL, izgradio je novi dalekovod 110 kV Kotor Varoš–Ukrina. Ovo je jedan od značajnijih projekata u velikom investicionom ciklusu Elektroprenosa BiH u segmentu izgradnje i rekonstrukcije dalekovoda. Iako je njegova izgradnja planirana još početkom 90-ih, uslovi za realizaciju stekli su se tek prošle godine.

Ugovor o izgradnji potpisan je početkom februara 2015, a projekat je realizovan prema planiranom roku od godinu dana. Konzorcijumu Elektroenergetika povjereni su nabavka materijala i opreme i kompletni radovi na izgradnji dalekovoda.

Na dalekovodu, čija je ukupna dužina trase 22 kilometra, priliku da pokaže profesionalnost i znanje dobila je jedna od mlađih ekipa iz divizije za dalekovode. Njihov zadatak bio je težak, jer zbog specifične konfiguracija terena nisu mogli koristiti savremenu mehanizaciju koju posjedujemo.

To ih je primoralo da prilikom montaže

stubova koriste stari metod rada, manualni. Za svih 46 stubova koje je instalirao Elnos BL, kompletna konstrukcija željezno-rešetkastih stubova ručno je podizana i montirana, segment po segment. Ovakav poduhvat ekipa je izvela uz izuzetnu sinhronizaciju rada svih učesnika, od onih na zemlji, do montera na vrhu stuba i visini od 25 do 40 m. U zavisnosti od visine stuba i samog terena, za montažu jednog stuba bilo je potrebno 10 do 25 radnika. Ručno je rađeno i razvlačenje konopa i sajli, a samo je za elektromontažu OPGW-a i faznih provodnika korištena naša savremena mehanizacija.

Sa ponosom možemo reći da je ovaj posao izveden uz poštovanje svih pravila struke, u ugovorenom roku i bez ijedne povrede na radu, iako je ovaj metod rada mnogo rizičniji i sporiji od standardnog. Veliki trud i profesionalizam nije ostao nezapažen ni kod investitora, pa su pohvale stigle od nadzornog organa i menadžmenta Elektroprenosa BiH.

Na novoizgrađenom dalekovodu 110 kV Kotor Varoš–Ukrina instalirana su ukupno 92 stuba,

sa faznim provodnicima Al/Fe 240/40 mm² i OPGW-om. Projekat je realizovan u cilju stabilnijeg snabdijevanja kupaca sa ovog područja i pouzdanijeg prenosa električne energije iz mini-hidroelektrana čija se izgradnja planira.

EN Joint venture Elektroenergetika, Elnos BL being the leader of JV, constructed a new transmission line 110 kV Kotor Varoš–Ukrina. This is one of the most significant projects in a big investment cycle of the company Elektroprenos BiH in the segment of reconstruction and construction of transmission lines. Although its construction was planned as far as in 1990s, realization conditions were achieved only last year.

Contract on construction was signed in the beginning of February 2015, and project was performed in the frame of one year plan. Joint venture Elektroenergetika was entrusted with purchase of material and equipment as well as all construction activities.

The youngest team of the transmission line

division got a chance to show their professionalism and knowledge on this transmission line, whose section is 22 km in total length. Their task was difficult, since the field configuration is a specific one – they could not use modern machinery we own.

This forced them to use an old work method in towers assembly – manual one. All 46 towers installed by Elnos BL were manually erected and assembled with entire structure of iron-lattice towers, segment by segment. Team performed this project with exemplary

synchronization of all participants, from the ones working on the ground to fitters on the top of tower and height from 25 to 40 m. Depending on the height of the tower and terrain itself, it took 10 to 25 people to assembly one tower. Ropes and cables were set manually. Our modern machinery was used only for electrical assembly of OPGW and phase conductors.

We are proud to say this project was performed in obeying all professional regulations, within deadline and with no worker injured although this method is more risky and slower

than the standard one. Great effort and professionalism did not go unnoticed with the Investor either, so the Engineer and the Management of the Elektroprenos BiH praised the work.

Newly constructed 110 kV Kotor Varoš–Ukrina transmission line has 92 towers installed in total with phase conductors Al/Fe 240/40 mm² and OPGW. Project was realized in the aim of more stable supply of the buyers from this area and more reliable transfer of electrical power from mini power plants, which are being planned for construction.

Auto-put Banjaluka–Doboj dobija konture budućeg izgleda

Highway Banjaluka–Doboj gets future shape outlines

SR DIONICA PRNJAVOR–DOBOJ

Elnos Grupa je u prethodnoj i u ovoj godini nastavila realizaciju ugovora sa generalnim izvođačima radova na izgradnji auto-puta Banjaluka–Doboj, Integral inženjeringom iz Laktaša i Granitom iz Skoplja.

Završili smo 90 odsto radova na izradi TK kablovske kanalizacije za SOS telefone, odnosno telefone za prvu pomoć, dok u narednoj fazi radimo postavljanje optičkog kabla od Doboja do Prnjavora.

Za nas je poseban profesionalni izazov posao u oblasti energetskeg napajanja portala. To je posao koji podrazumijeva uvođenje ITS-a (inteligentni transportni sistem), za koji smo uradili energetske rješenje, projekat i proračun.

Možemo biti ponosni na činjenicu što smo dobar dio posla na dionici auto-puta Prnjavor–Doboj uspješno obavili, uprkos činjenici da su poplave, i u dužem periodu nakon njih, donijele veliki broj nepravilnosti.

Za ovu dionicu je specifično to da je većina auto-puta rađena na riječnom koritu. Tako je jedna od posebnosti našeg poduhvata bilo postavljanje kablova ispod riječnog korita. Prvo su građevinci uradili izmještanje riječnog korita, prirodno ga isušili i premjestili. Nakon toga, naši radnici su iskopali kanal, betonirali ga i stavili plastične cijevi na 1,6 metara ispod



riječnog korita. Nakon ovih radova postavili smo kabl i uspješno okončali posao.

DIONICA BANJALUKA–PRNJAVOR

Na projektu izgradnje auto-puta Banjaluka–Doboj angažovani smo na više poslova u okviru druge dionice Banjaluka–Prnjavor.

U okviru poslova na ovoj dionici sa Integral inženjeringom i Granitom smo potpisali ugovor za izmještanje kompletnih srednjenaponskih

i niskonaponskih mreža i dalekovoda 110 kV Laktaši–Topola i 400 kV Tuzla–Banjaluka, te za izgradnju SOS instalacije.

Radove na drugoj dionici, u odnosu na prvu lakše obavljamo zbog činjenice da je povoljnija konfiguracija tla.

Zanimljivo je da projekat izgradnje auto-puta u cjelosti podrazumijeva izgradnju 64 objekta na putu. Ti objekti su mostovi, tuneli, nadvožnjaci i podvožnjaci. U okviru poslova na drugoj

dionici puta radiće se i tunel u Potočanima, a naši operativci su zaduženi za izvođenje radova na dalekovodnoj mreži oko tog tunela.

Dio poslova koji se odnosio na srednji i niski napon na ovoj dionici smo završili u procentu od 80 odsto, a preostali su nam radovi na dalekovodima, što je upravo najzahtjevniji dio našeg posla. Naime, naš zadatak na drugoj dionici podrazumijeva postavljanje velikog broja novih i zamjenu i izmještanje starih dalekovoda na ukupnoj dužini od oko tri kilometra.

EN SECTION PRNJAVOR-DOBOJ

In the past and during this year, Elnos Group has continued realization of the contract with general contractors of the works in construction of the highway Banjaluka-Doboj, Integral inženjering from Laktaši and Granit from Skoplje.

We completed 90 per cent of works in construction of TC cable ducts for SOS telephones, i.e. emergency telephones, whereas in the following stage, we should lay optic cables from Doboj to Prnjavor.

It is special professional challenge to work in the field of electrical power supply of por-

tals. Those are works including introduction of ITS (intelligent transport system). We performed electrical power design, project and budget for it.

We can be proud of the fact that we performed a good deal of works of section of the highway Prnjavor-Doboj, despite the fact that floods, long after they had happened, resulted in many troubles.

A specific feature of this section is that most of the highway was performed on the river bed. One of special issues of our endeavor was to lay cables under the river bed. First, construction workers relocated river bed, drained it naturally and relocated. After this, our employees dug a canal, cast it in concrete and laid plastic pipes 1.6 meters under the river bed. After these works, we laid cable and completed works successfully.

SECTION BANJALUKA-PRNJAVOR

We are engaged in numerous works within the second section Banjaluka-Prnjavor of the project of constructing highway Banja Luka-Doboj.

In the frame of the works within this section,

we signed a contract for relocation of complete medium voltage and low voltage networks and 110 kV transmission line Laktaši-Topola and 400 kV Tuzla-Banjaluka, as well as for construction of SOS installations with Integral inženjering and Granit.

Compared with the first section, we execute works of the second section easier due to the fact that soil configuration is more favorable.

It is interesting to mention that project of constructing the highway entirely includes construction of 64 road facilities. Those facilities are: bridges, tunnels, overpasses and underpasses. In the frame of second section works, tunnel in Potočani is going to be constructed, and our employees are in charge of works on transmission line network around this tunnel.

We completed 80 per cent of a part of works referring to medium and low voltage of this section. We still have to perform works on transmission lines, which, actually, is the most demanding part of our works. Namely, our task on the second section includes installation of a big number of new and replacement and relocation of old transmission lines in total length of about three kilometers.

Kapitalni projekat na modernizaciji Koridora 10

Principal project in modernization of the Corridor 10



Izgradnjom dionice Gilje-Ćuprija-Paraćin Železnice Srbije dobile su novu, dvokolosiječnu, elektrifikovanu prugu projektovane brzine 160 km/h. Visokorizična i kratkotrajna prevezivanja pruge, zajedno sa puštanjem saobraćaja na novim dionicama, predstavljala su poseban profesionalni izazov

Constructing section Gilje-Ćuprija-Paraćin, the Serbian Railways got a new, two-lane, electrified railway design speed of 160 km/h. High-risk and short-term reconnections of railway to traffic commission on new sections were a special professional challenge



Novoizgrađeno željezničko stajalište Gilje / New built train stop Gilje

SR Elnos Grupa učestvovala je u jednom od kapitalnih projekata na modernizaciji Koridora 10, rekonstrukciji i modernizaciji dionice Gilje-Ćuprija-Paraćin, na pruzi Beograd-Niš. Radovi na modernizaciji pruge počeli su početkom novembra 2013. godine, a prvi vozovi pojurili su novom prugom u oktobru 2015. godine.

Poslovi Elnos Grupe obuhvatali su veoma kompleksne radove rekonstrukcije i modernizacije kontaktne mreže, kao i izgradnju osvjettljenja stajališta Gilje i rekonstrukciju postrojenja za sekcionisanje stanice Ćuprija.

Na ovoj dionici, koja iznosi oko 16,78 km pruge, ugradili smo oko 1.200 m³ betona, u preko 400 temelja za stubove i portale, oko 120 t čelične konstrukcije, tj. stubova i portala za kontaktnu mrežu, montirali preko 1.500 sklopova za nošenje i zatezanje kontaktne mreže, razvukli i regulisali preko 31 km nove kontaktne mreže i demontirali oko 30 km postojeće kontaktne mreže sa pripadajućom opremom.

Projekat je finansiran kreditom Evropske investicione banke u iznosu od 16,2 miliona evra, investitor – Železnice Srbije, a Elnos Grupa je bila specijalizovani izvođač radova Siemens-a Beograd.

Na projektu su bili angažovani naši iskusni monter i, kao i pripadajuća teška mehanizacija. Radovi su se odvijali pod otežanim uslovima stalnog saobraćaja koji se nije smio zaustaviti, jer je dionica dio Koridora 10. Visokorizična i kratkotrajna prevezivanja pruge sa puštanjem saobraćaja na novim dionicama, predstavljala su poseban profesionalni izazov za sve koji su učestvovali na ovom projektu. Kako je riječ o visokorizičnom projektu, posebna pažnja bila je posvećena bezbjednosti i zaštiti na radu.

Značaj ove reference za kompaniju je veliki, s obzirom na to da je željezničkoj infrastrukturi u Srbiji, a dijelom i u regionu, potrebna modernizacija. U čitavom regionu je mali broj kompanija koje mogu uraditi projekte elektrifikacije sistema za kontaktnu mrežu po sistemu 'ključ u ruke'. Mi smo jedna od njih, a uspješna realizacija ovako kompleksnog projekta, odlična je preporuka za naredne poslove.

Izgradnjom ove dionice Železnice Srbije dobile su novu, dvokolosiječnu, elektrifikovanu prugu od novog stajališta Gilje do ulaska u stanicu Paraćin, projektovane brzine 160 km/h.

EN Elnos Group took part on one of the principal projects in modernization of the Corridor 10, reconstruction and modernization of section Gilje-Ćuprija-Paraćin, a part of railway Beograd-Niš. Works of railway modernization started in early November 2013, and the first trains ran on new railway in October 2015.



Razvlačenje voznog voda / Overhead line distribution

Works that Elnos Group performed included very complex activities of reconstruction and modernization of contact network and our part of the work also comprised construction of lighting Gilje train stop and reconstruction of plant for Ćuprija stop sectioning.

In this railway section, about 16.78 km long, we built in about 1,200 m³ of concrete in over 400 foundations for poles and portals, about 120 t of steel construction, i.e. poles and portals for contact network, assembled about 1,500 circuits for contact network bearing and tightening, distributed and regulated over 31 km of new contact network and disassembled about 30 km of the existing contact network with accompanying equipment.

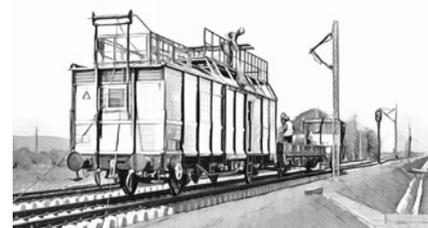
Project was financed by credit line by European Investment Bank amounting to EUR 16.2 million, Investor is Serbian Railways and Elnos Group was a specialized contractor of Siemens, Belgrade.

Our experienced fitters were hired for this project with accompanying heavy machinery. Works were performed in aggravated conditions with constant traffic going on, which could not be interrupted since the section is a part of the Corridor 10. High-risk and short-term reconstructions of railway with traffic commission on these sections were a special professional challenge for all the participants of this project. As this is a high-risk project, special attention was paid to safety and protection at work.

Importance of this reference for the company is a big one considering the fact that railway infrastructure in Serbia, and partly in the region, needs modernization. Entire region has a small number of companies capable of performing "turn-key" projects of electrification

for contact network system. We are one of them and successful realization of this complex project is an excellent reference for the upcoming ventures.

Constructing this section, the Serbian Railways got a new, two-lane, electrified railway from new train stop Gilje to entrance in the train stop Paraćin with design speed of 160 km/h.



TEŠKA MEHANIZACIJA

NA OVOM PROJEKTU KORIŠTENI SU SLJEDEĆA TEŠKA MEHANIZACIJA: RADNI MONTAŽNI VAGON, TEŠKA MOTORNA DREZINA, OTVORENI VAGONI, SPECIJALNE DIZALICE ZA MONTAŽU I DEMONTAŽU STUBOVA I PORTALA KONTAKTNE MREŽE, KAMIONI ZA TRANSPORT.

HEAVY MACHINERY

THE FOLLOWING HEAVY MACHINERY WAS USED FOR THIS PROJECT: ASSEMBLY WAGON FOR OCL, HEAVY-DUTY MOTOR VEHICLES FOR RAILWAY, OPEN WAGONS, SPECIAL CRANES FOR ASSEMBLY AND DISASSEMBLY OF POLES AND PORTALS FOR CONTACT NETWORK, TRANSPORT TRUCKS.

Dio smo poduhvata

MODERNE BUDUĆNOSTI ŽELJEZNICA RS

We are a part of modern endeavor of future of RS Railways

U okviru ovog posla smo odbranili 24 zahtjevna projektna rješenja i postali operativna karika realizacije jednog od najznačajnijih poduhvata modernizacije infrastrukture Željeznica RS

In the frame of this project, we proved 24 demanding design solutions and became operational link in realization of one of the most important endeavors in modernization of the RS Railways infrastructure

SR Dotrajala infrastruktura Željeznica Republike Srpske se ove godine konačno našla pred velikim projektnim izazovom, obimnim poslom rekonstrukcije i modernizacije sistema signalizacije i telekomunikacija.

Izvođenje ovog projekta je jedan od najznačajnijih poduhvata u novijoj historiji Željeznica RS, a njegovom realizacijom biće omogućeno kvalitetnije i bezbjednije odvijanje željezničkog saobraćaja u mreži ove kompanije.

Željeznice RS su kao glavnog izvođača radova na ovom projektu izabrale kompaniju AŽD Praha, a u okviru ovog posla će biti angažovano više podizvođača, među kojima je obiman i zahtjevan dio posla dobio i banjalučki Elnos.

Povjeren nam je posao koji obuhvata radove u 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 projekta uradićemo rekonstrukciju i modernizaciju šest željezničkih stanica: Ostružnja, Šnjegotina, Jošavka, Čelinac, Vrbanja i Banjaluka. Rok za izvođenje radova je 13 i po mjeseci od potpisivanja građevinske dozvole, zvaničan početak projekta je mart 2016, a završetak maj iduće godine.

POSAO VISOKE ODGOVORNOSTI

Aleksandar Čomić, rukovodilac divizije za industriju i instalacije u Elnosu Banjaluka je konstatovao da se u okviru ovog projekta operativna i inženjerski kadar kompanije našao pred mukotrpnim poslom i velikom odgovornošću.

Čomić je precizirao da je zadatak Elnosa izrada projektno-tehničke dokumentacije, isporuka materijala i opreme, zatim montaža i puštanje u rad sistema, kao i da ima više faza u okviru ovog projekta koji su za Elnos poseban izazov.

„Radimo specifičan tip poslova kao što su kontaktna mreža i napajanje iz kontaktne mreže, zatim grijače skretnica i NN kablovski razvod specifičnog tipa“, kaže on.

Čomić je dodao i to da će Elnos u okviru ovog posla montirati savremenu opremu za potrebe napajanja SS i TK uređaja, grijanje skretnica, te same željezničke stanice.

ODBRANILI SMO ZAHTJEVE 24 PROJEKTA

Elnos Banjaluka je u okviru ovog posla

obavio veoma zahtjevan zadatak koji je podrazumijevao izradu i odbranu 24 projekta.

„Uložili smo veliki trud u stvaranje projektnih rješenja koja nisu bazirana samo na postavljenim zahtjevima, već smo dali i neka tehnički bolja rješenja. Suštinski smo se potrudili da napravimo projekat koji će imati odličnu podlogu i za budućnost“, rekao je Milorad Lalović, glavni inženjer Elnosa Banjaluka o projektu.

Rekonstrukcija naših željeznica je počela prije nekoliko godina, što je u interesu ne samo RS i BiH već i u interesu Evrope.

SIGURNOST U FOKUSU

Projekat vrijedan 15.811.780 evra biće finansiran iz preostalih kreditnih sredstava Evropske banke za obnovu i razvoj i Evropske investicione banke.

Ovaj obiman posao ima ogroman značaj na polju poboljšanja stepena sigurnosti željezničkog saobraćaja, jer postojeća mreža Željeznica RS u velikoj mjeri nema odgovarajuću prateću signalizaciju, dok je njena oprema zastarjela i nepouzdana.

EN Finally, outdated infrastructure of the Railways of the Republic of Srpska has faced a big design challenge this year – a huge project of reconstruction and modernization of the signal and telecommunication system.

Performance of this project is one of the most important endeavors in recent history of the RS Railways. Its realization will provide better quality and safer running of the railway traffic in the network of this company.

RS Railways appointed company AŽD Praha as the Main Contractor for the works in this project. Several subcontractors will be hired for this project, and voluminous and demanding works were assigned to Elnos Banjaluka among the rest.

We were assigned the part that includes works in four stages: power supply of distributive network, activities of power supplying of contact network, LV cable distribution and activities referring to switch heaters.

In the frame of the project, we are going to reconstruct and modernize six railway stations as follows: Ostružnja, Šnjegotina, Jošavka, Čelinac, Vrbanja and Banjaluka. Deadline is 13 and half months from the date of signing construction permit. Official

start of the project is March 2016, and end date is May next year.

WORK OF HIGH LEVEL RESPONSIBILITY

Aleksandar Čomić, the Head of Division for industry and installations in Elnos Banjaluka said that, in this project, operative division and engineers of the company had been faced to extremely difficult work and high level of responsibility.

Čomić stated that Elnos's task is to create design-technical documents, delivery of material and equipment, assembly and commission of the system. Čomić also stated there were many phases in the frame of this project and these are a special challenge for Elnos.

“We perform specific type of activity such as contact network and power supply of the contact network, switch heaters, whereas LV cable distribution is specific type of distribution”, says Čomić.

Čomić also added that Elnos, in the frame of this project, will install modern equipment for supply of SS and TC devices, switch heaters and railways station itself.

WE PROVED OF 24 DESIGNS

In the frame of this project, Elnos Banjaluka performed a very demanding task that included making and proving 24 designs.

“We put a lot of effort in making design solutions that were not based only on the requested, but we also provided some better technical solutions. Essentially, we tried to make a design with excellent background for the future as well”, Milorad Lalović, the Head Engineer of Elnos Banjaluka explained the project.

Reconstruction of our railways started several years ago which is for the best interest of not only the RS and BiH but Europe as well.

SAFETY IN FOCUS

Project in the amount of € 15,811,780 will be financed from the remaining credit lines of the European Bank for Reconstruction and Development and European Investment Bank.

This voluminous project has a huge importance in the field of improving safety level of railway traffic, since the existing network of the RS Railways, in its bigger part, does not have appropriate appertaining signalization whereas its equipment is outdated and unsafe.

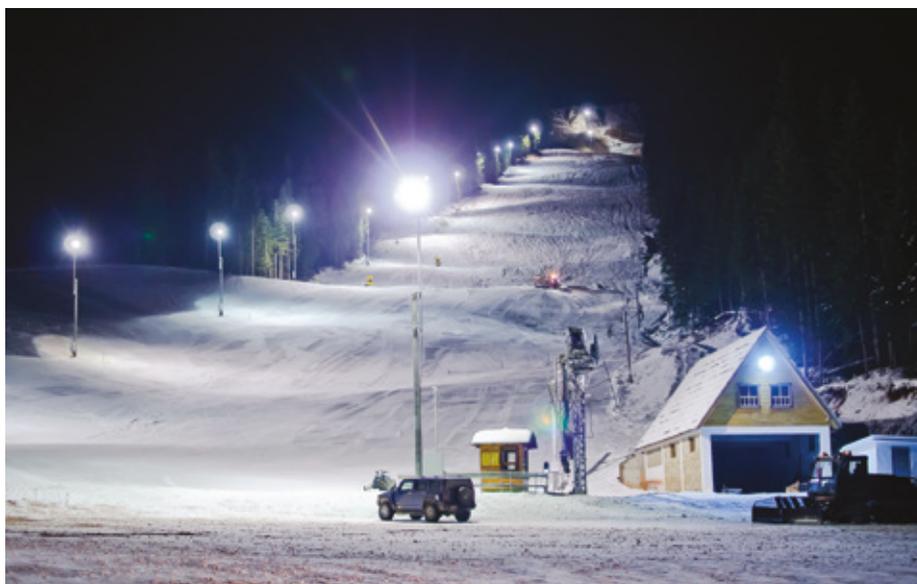
Osvijetlili smo skijalište Gornje Pale-Ravna planina

We illuminated Ski Center Gornje Pale-Ravna planina



Elnos Grupa uspješno realizovala projekat postavljanja rasvjete sa specifičnim sistemom betonskih stubova sa protezama, na koje su pozicionirani reflektori. Ovo je jedinstven poduhvat koji je kod nas izveden prvi put

Elnos Group successfully realized the project of installation of lighting with specific system of concrete poles extension brackets, where head lights were installed. This is a unique undertake performed for the first time in our country



Skijalište Gornje Pale-Ravna planina / Ski Center Gornje Pale-Ravna planina

SR Banjalučki Elnos BL može biti ponosan na činjenicu da je protekle zimske sezone obavio zahtjevan posao postavljanja rasvjete na ski-stazi Gornje Pale-Ravna planina, koja je specifična jer se jedina u okviru Jahorinskog kompleksa nalazi na pravcu od Pala ka Jahorini, a ne obrnuto.

Projekat postavljanja rasvjete na stazi dugoj 1.200 metara je podrazumijevao izgradnju trafostanice od 1.000 kVA na njenom vrhu, zatim postavljanje jednog kilometra kablova koji služe za napajanje reflektora, ali i topova za osnježavanje. Međutim, projekat je sa sobom donio i pečat specifičnosti, jer su radnici Elnosa BL, prvi put kod nas izveli i postavljanje betonskih stubova sa protezama na koje su postavljeni reflektori. Ovim protezama omogućeno je uvlačenje i izvlačenje reflektora na potrebnu visinu.

Preciznije govoreći, u okviru projekta postavljen je 21 betonski stub sa protezama i reflektorima, od kojih dva osvjetljavaju stijenu, a ostali kompletnu stazu.

Sa izvučenim protezama reflektori sežu na visinu od 16 metara i obezbjeđuju maksimalnu

osvijetljenost. Ipak, stvaranje opcije njihovog spuštanja na visinu od 12 metara je bilo neophodno kako bi se nesmetano moglo raditi održavanje rasvjete, jer standardne korpe koje se koriste za održavanje rasvjete mogu dosegnuti maksimalno 12 metara.

Postavljanje stubova sa protezama se koristi veoma rijetko, a Elnos BL je postavivši ih napravio svojevrsno originalan zahvat. Proteze za reflektore je proizvela kompanija Mig elektro, a Elnos BL je uradio tehnička rješenja za njih.

Važno je napomenuti i to da su postavljeni reflektori snage 1000 W kakvi se koriste za osvjetljenje velikih sportskih terena dok, poređenja radi, treba reći da standardni reflektori imaju snagu od 400 W. Ovaj posao Elnos Grupa obavila je za potrebe investitora, kompanije Majnex iz Pala. O značaju investicije iz Majnex-a ističu: „Osvjetljenje staze i sistem za osnježavanje upotpunili su i zaokružili ponudu Ski centra Ravna Planina u zimskoj sezoni. Tokom cijele sezone imali smo noćno skijanje, koje je postalo svojevrsna atrakcija u regiji, s obzirom na to da ostali ski centri nemaju

ovu mogućnost ili je nude samo vikendom. Zahvaljujući ovoj uspješnoj investiciji, omogućili smo svojim skijašima i gostima potpun i nezaboravan ugođaj i potvrdili status vrhunskog skijališta.“

Pored ovog stepena specifičnosti radova, možemo biti ponosni i na činjenicu da su naši radnici uspjeli izvesti radove u veoma teškim zimskim vremenskim uslovima, u okviru kojih su se izuzetno uspješno nosili sa jako zahtjevnim i teškim poslom.

EN Elnos BL from Banja Luka is proud of the fact that, in the previous winter season, it performed a demanding work of installation of lighting in the Ski Center Gornje Pale-Ravna planina, which is a specific path. It is the only path going from Pale to Jahorina, and not vice versa, out of all paths located within Jahorina's complex.

Project of installation of lighting on the path 1,200 meters long included construction of 1000 kVA substation on its top, setting one kilometer of cables for powering the head lights and artificial snow system. How-

ever, the project was marked as a specific one since employees of the Elnos BL installed concrete poles with extension brackets, where head lights were installed for the first time. These extension brackets provide contraction and extraction of head lights to the necessary height.

To be more precise, in this project, 21 concrete pole with extension brackets and head lights - two head lights illuminate the rock and the rest of them illuminate the complete path - were installed.

With extension brackets extracted, the head lights go up to 16 meters and provide maximum illumination. However, creating the possibility of their lowering to the height of 12 meters was necessary in order to maintain

the lighting system undisturbed since standard buckets used for lighting maintenance can reach the maximum of 12 meters.

Installation of poles with extension brackets is used very rarely and Elnos BL did a sort of original venture by installing them. Extension brackets for head lights were produced by Mig elektro, whereas Elnos BL created technical solutions for them.

It is also important to mention 1000 W head lights were installed and these are used for illumination of big sport fields, whereas, for comparison, it is necessary to mention that standard head lights are 400 W. Elnos Group performed these works for the Investor - company Majnex from Pale. As for Investment significance, people from Majanex state: "Illumi-

nation of ski track and artificial snow system completed and rounded up offer by Ski-Center Ravna planina in winter season. Throughout the season, we had night skiing, which became sort of attraction in the region considering the fact that other ski centers do not have this possibility or they offer it only in weekends. Thanks to this successful investment, we provided our skiers and guests with full and unforgettable atmosphere and certified status of top ski center."

Apart from this degree of specific works, we can also be proud of the fact that our employees made it to perform the works in extremely difficult winter weather conditions, where they very successfully coped with really demanding and hard work.

Instalacije za rad u uslovima strogih minusa

Working installations in minus weather conditions



Uspješno smo obavili zadatak ugradnje najsavremenije elektroenergetske opreme u novoj i savremenoj hladnjači kompanije Ledo

We successfully installed the most modern electrical power equipment in new and modern cold storage of the company Ledo



Nova hladnjača LED0 / New cold storage LED0

SR Na 4.500 metara kvadratnih prostora u naselju Ramići nadomak Banjaluke, kompanija za distribuciju smrznute hrane Ledo izgradio je jednu od najvećih i najkompleksnijih hladnjača u BiH. Izgradnja ove hladnjače je nova i veoma značajna karika u investicionom ciklusu poznate hrvatske kompanije, čiji je brend jedan od najprepoznatljivijih na ovdašnjem tržištu.

Realizacija ovog projekta je specifična, jer se radi o objektu koji podrazumijeva ugradnju najsavremenije elektroenergetske opreme koja treba da obezbijedi rad na -25 stepeni Celzijusovih. Glavni ugovarač EIB International je donio odluku da zahtjevan podugovarački posao povjeri Elnosu BL Banjaluka.

Naši operativci su se našli pred posebnim ugovorenim zadatkom koji zahtijeva instalaciju

opreme predviđene za rad u komorama i na temperaturama koje sežu 25 stepeni ispod nule, što je u određenim segmentima izvođenja posla dovelo do toga da se sa nekim okolnostima srećemo prvi put.

Odlučili smo da shodno striktnim zahtjevima projektnog postupka ugradimo Zumtobel LED rasvjetu, koja je proizvod jednog od vodećih svjetskih proizvođača u ovom

domenu. Pored ovog vida specijalne rasvjete u pogone smo instalirali opštu i panik rasvjetu.

U okviru dijela posla koji podrazumijeva instalacije osiguravajuće opreme ugradili smo vatrodjavu Siemens, koja osigurava vrhunsku sigurnost zaštite i jedini je brend koji zadovoljava uslov pouzdanog rada na tako niskoj temperaturi.

U okviru ovog projekta Elnos je napravio isporuku i montažu kompletne opreme, koja obuhvata opremu za trafostanicu, elektroinstalacije jake i slabe struje objekta, i vanjsko uređenje. Instalirali smo trafostanicu snage 1x630 kVA, montirano je srednjenaoponsko postrojenje Schneider. Naši operativci su radove na ovoj velikoj hladnjači okončali u periodu od decembra prošle do aprila ove godine.

EN At 4,500 square meters of space in Ramići, in Banja Luka vicinity, Ledo, a company for

distribution of frozen food, built one of the biggest and most complex cold storages in BiH. Building a new cold storage is a new and very important link in investment cycle of the renowned Croatian company, whose brand is one of the best recognized in this market.

Realization of this project is a specific one since this is a facility including installation of the most modern electrical power system equipment, which should provide operation at -25 °C. The Main Contractor, EIB International Banja Luka, decided to entrust these demanding subcontract works to Elnos BL Banja Luka.

Our employees faced a special assignment requesting installation of equipment planned for work chambers and in temperatures going as far as 25 degrees below zero, which, in certain segments, of work performance lead to the fact that those were circumstances we met for the first time.

Due to strict requests of the project procedure, we decided to install Zumtobel LED lighting, which is produced by one of the leaders of this field in the world. Apart from this type of special lighting, we also installed general and panic lighting in the plant.

In the part of the project referring to installations of security equipment, we installed fire alarm by Siemens, which provides the highest level of protection and is the only brand meeting request of reliable work at such low temperatures.

In the frame of this project, Elnos delivered and assembled entire equipment, which included equipment for substation, electrical installations of high and low current of the facility, and surroundings. We installed 1x630 kVA substation and medium voltage plant by Schneider Electric. Our employee performed activities of this big cold storage from December to April this year.

Osnažili smo proizvodne kapacitete kompanije Jaksche

We increased production capacity of company Jaksche



Pored izvođenja svih građevinskih i elektromontažnih radova na izgradnji trafostanice čiji je maksimalan kapacitet 2x1000 kVA, ponosni smo na činjenicu da smo u okviru podrške radu pogonima kompanije Jaksche ugradili najsnažniji i najveći agregat u dosadašnjoj istoriji svog rada

Apart from performing all the construction and electrical assembly works in constructing substation of maximum capacity 2x1000 kVA, we are proud of the fact that we installed the most powerful and biggest generator in our so-far working history in the frame of work support for the company Jaksche



Pogon kompanije Jaksche / Plant of the Jaksche company

SR Jedan od velikih poslova u okviru kojeg smo mi u Elnos Grupi bili podrška sistemskom proširenju privrednih kapaciteta jedne fabrike, sasvim sigurno je i izgradnja trafostanice za kompaniju Jaksche.

Ovaj poznati proizvođač dijelova od plastike ojačane staklenim vlaknima za veoma širok spektar mašina, zbog proširenja obima proizvodnje iskazao je potrebu za izgradnjom nove transformatorske stanice koja može da opsluži novi nivo proizvodnje.

Upravo je zbog novonastalih potreba ove firme Elnos Grupa obavila projekat izvođenja svih građevinskih i elektromontažnih radova na izgradnji trafostanice čiji je maksimalan kapacitet 2x1000 kVA.

Zbog specifičnosti postrojenja kompanije Jaksche, koja se bavi topljenjem i oblikovanjem plastike, ovaj posao je pored izgradnje trafostanice iziskivao potrebu ugradnje pomoćnog sistema napajanja, odnosno izuzetno snažnog agregata.

Upravo zbog toga, ugradili smo i agregat maksimalne snage 1000 kVA, čija ugradnja i puštanje u rad samo po sebi predstavlja i jednu od najvećih specifičnosti cjelokupnog posla za ovu kompaniju.

Naime, radi se o najsnažnijem i najvećem agregatu koji je Elnos do sada ugradio.

Proizvođač agregata je Genmac, a tip je Genmac Extreme G1000PSA. Težina agregata iznosi

11.710 kg, odnosno skoro 12 t. Ovaj agregat je dugačak 8,6 metara, širok dva, a visok tri metra.

Postavljanje i povezivanje agregata je donijelo niz posebnih uslova koje je bilo potrebno ispuniti.

Kao prvo, bilo je neophodno pripremiti teren, izliti armiranu betonsku ploču debljine oko 20 centimetara koja će izdržati njegovo opterećenje, istovariti agregat na lokaciju uz upotrebu velike dizalice, povezati ga sa NN ormarom, te ga u konačnici pustiti u rad.

Osnovna uloga ovog agregata je da u slučaju nestanka napajanja električnom energijom, osigura dovoljnu autonomiju za sva prioriteta postrojenja koja u tom trenutku rade.

U okviru ovog projekta smo sve radove realizovali u periodu od početka marta pa do kraja maja 2015.

EN One of big projects where we, Elnos Group, were support to system expansion of economical capacities of a factory surely is construction of substation for company Jaksche.

Due to expanding production volume, this renowned producer of plastic parts enforces by glass fibers intended for a very large spectrum of mechanization, expressed its need for construction of new transformer station whose capacity could serve new production level.

Because of new needs of this company, Elnos Group performed all construction and electri-

cal assembly works in constructing substation of maximum capacity 2x1000 kVA.

Due to specific features of the plant, company Jaksche, which melts and shapes plastics, apart from substation construction, this work asked for necessity to build supporting system of power, i.e. very strong generator.

Hence, we also installed generator of maximum power 1000 kVA, whose installation and commission themselves are one of the most specific features of entire work for this company.

Namely, this is more powerful and biggest generator that Elnos has built so far.

Generator was produced by Genmac, and type is Genmac Extreme G1000PSA. Generator's weight is 11,710 kg, i.e. nearly 12 t. Generator's length is 8.6 meters, width 2 meters and it is 3 meters high.

Installation and connection of the generator asked for a series of special conditions to meet.

Firstly, we had to prepare location, cast reinforced concrete slab approximately 20 centimeters thick, to support its weight, unload generator to the location using a big crane, connect it to LV cabinet, and finally commission it.

The main role of this generator is to ensure enough autonomy for all the priority plants operating at the moment of failure to supply electrical power.

We performed all the works in this project in period from early March to late May 2015.



Montaža agregata Genmac / Assembly of Genmac generator

Elektroinstalacije od temelja do pogona

Electrical installations from foundation to plant



Proizvodni pogon Lattonedil / Production plant of Lattonedil

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U okviru projekta izgradnje najvećeg regionalnog centra italijanske kompanije Lattonedil obavili smo poslove kompletnog uvođenja elektroinstalacija

In the frame of constructing project for the biggest center of Italian company Lattonedil, we installed entire electrical installations

SR Agroindustrijska zona u Novoj Topoli je zbog dobre infrastrukture i blizine EU postala poprište novih investicionih ciklusa. Snažnu investicionu poziciju ove lokacije je prepoznala i italijanska kompanija Lattonedil, jedan od najvećih svjetskih proizvođača krovnih panela, zbog čega se njen menadžment odlučio da upravo tu gradi svoj najveći regionalni centar.

U okviru ove investicije, vrijedne 20 miliona konvertibilnih maraka, Lattonedil gradi proizvodne pogone na čak 12.000 metara kvadratnih, a kompletne poslove uvođenja elektroinstalacija u ovom objektu ova italijanska firma je povjerila Elnosu BL Banja Luka.

Za nas, u ovom poslu, s jedne strane specifičan izazov bila je sama veličina ovih pogona, dok je s druge strane to bila i činjenica da smo

dobili kompletan posao uvođenja elektroinstalacija od temelja pa sve do proizvodnih pogona.

Aleksandar Čomić, rukovodilac divizije za industriju i instalacije Elnosa BL je precizirao da je u okviru ovog projekta bilo neophodno obaviti radove na instalaciji jake i slabe struje.

„Radovi na elektroinstalaciji jake struje podrazumijevali su isporuku i polaganje napojnih energetskih kablova, spajanje i njihovo puštanje u rad pod napon, a što se tiče slabe struje, uradili smo više faza koje podrazumijevaju kompletne sljedeće instalacije: video-nadzor, protivprovalne instalacije, sistem detekcije pentana, računarsku mrežu i instalacije“, kazao je Čomić.

Elnos BL je pored ove dvije vrste posla u novim pogonima Lattonedil realizovao i posao

uvođenja osvjetljenja parking prostora, ugradnje kandelabera i odgovarajućih rasvjetnih tijela.

Izvođenje građevinskih radova na fabrici Lattonedil BiH je ušlo u posljednju fazu, a u skladu s poslovnim planovima fabrika treba biti pušten u rad početkom iduće godine.

EN Due to good infrastructure and vicinity to the EU, agricultural-industry zone in Nova Topola became a center of new investment cycles. Strong investment position of this location has also been recognized by Italian company Lattonedil, one of the biggest world producers of roof panels, due to which its management decided to build its biggest regional center here.

In the frame of this investment amounting to 20 million Bosnian Marks, Lattonedil builds production plants as big as 12,000 square meters, and all the activities of electrical installations in this facility were entrusted to Elnos BL Banja Luka by this Italian company.

On one hand, size of this plant itself was a specific challenge for us in this project, and on the other hand it was a fact that we got entire electrical installations works from foundations up to production plants.

Aleksandar Čomić, the Head of division for industry and installations in Elnos BL, specified that it was necessary to perform low and high current installations in the frame of this project.

“Installation of high current included delivery

and setting of supply electrical power cables, their connection and commission. As for low current, we performed several phases including entire following installations: video-surveillance, anti-burglary installations, system of pentane detection, IT network and installations”, said Čomić.

Apart from these two types of works in new Lattonedil plants, Elnos BL also realized installation of lighting in the parking lot, masts and appropriate lighting fixtures.

Performance of construction works in factory Lattonedil BiH is in its last phase and in line with factory business plan, the factory should be commissioned at the beginning of the next year.

Arcelor Mittal ukazao povjerenje Elnosu

Arcelor Mittal showed confidence in Elnos

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Ugovorena dva posla ugradnje specifične elektroenergetske opreme koja će omogućavati i obezbjeđivati deponovanje mulja koji nastaje kao nusprodukt proizvodnje željezne rude

Two projects of constructing specific electrical power equipment contracted; this equipment shall provide and deliver deposit of sludge, being the by-product in production of iron ore

SR Rudnik željezne rude Omarska, koji posluje kao dio jedne od najvećih svjetskih kompanija za proizvodnju čelika giganta Arcelor Mittal-a, našao se pred specifičnim zadatkom osavremenjavanja dijela proizvodnog procesa.

Naime, u okviru velikog kompleksa ovog rudnika, Arcelor Mittal je kao investitor iskazao potrebu za ugradnjom specifične elektroenergetske opreme koja će omogućavati i obezbjeđivati deponovanje mulja koji nastaje kao nusprodukt proizvodnje željezne rude.



Asinhroni motor 500 kW / Asynchrony engine 500 kW

Elnos Grupa je sa investitorom potpisala dva ugovora koji se po suštini posla nadovezuju jedan na drugi.

Prvi ugovor u vezi je sa isporukom i ugradnjom asinhronog motora 500 kW i frekventnog regulatora od 500 kW sa pratećom automatikom, senzorima, PLC-ovima za kompletno upravljanje i nadzor toga motora.

Odmah na početku, a u vezi sa ovim ugovorom, važno je istaći činjenicu da u cijeloj regiji postoji malo industrijskih pogona koji su toliko

snažni i veliki da uopšte mogu pred nas staviti zahtjev ugradnje ovako snažnog motora. Naime, u dosadašnjoj praksi ugovarači su od nas obično zahtijevali ugradnju motora manje snage.

Pored činjenice da motor koji smo ugradili posjeduje snagu od 500 kW, on ima i specifičan program (aplikaciju) regulacije brzine koji uključuje rad senzora. Ova aplikacija je vrlo zanimljiva i specifična i nemamo priliku da je radimo često. Prvo je bilo potrebno da napravimo algoritam upravljanja i zaštite motora

snage 500 kW. Zatim su u postrojenju montirani senzori za praćenje nivoa mulja u rezervoaru i za nadzor rada motora. Na osnovu ovako dobijenih informacija, a preko zadatog algoritma, reguliše se brzina ovog moćnog motora.

Za nas kao kompaniju je cijeli ovaj projekat predstavljao jedan poseban izazov, jer smo ovako veliki elektromotorni pogon radili prvi put.

U sklopu ovog projekta isporučili smo i transformator, frekventni regulator i motor, te prateću opremu za automatiku, za nadzor i upravljanje procesima.

Posao ugradnje ovog motora je zahtjevan i rizičan. Najveći dio posla smo obavili sami, uz obezbijedenu tehničku podršku isporučioća opreme.

Drugi ugovor koji smo sklopili se odnosi na isporuku trafostanice na sankama i prateće rasvjete staroga kopa, video-nadzor i upravljanje jednog motora snage 150 kW.

EN Iron ore mine Omarska, operating as a part of one of the biggest world companies for steel production, giant Arcelor Mittal, has faced a specific task of modernizing a part of their pro-

duction proceses.

Namely, within a big complex of this mine, Arcelor Mittal, being the Investor, expressed need for installation of specific electrical power equipment to enable and provide deposit of sludge, being the by-product in production of iron ore.

Elnos Group signed two contracts with the Investor. Essentially, these two contracts are connected to each other.

The first contract is referring to supply and installation of 500 kW asynchrony engine and 500 kW frequency regulator with accessory automation equipment, sensors, PLCs for comprehensive control and monitoring of the engine.

At the very start, and in reference to this contract, it is important to say there is a small number of industrial plants in whole region that are so powerful and big to request installation of this powerful engine from us at all. Namely, so far, the Contractors usually requested installation of less powered engines from us.

Aside from the fact that the engine we installed is 500 kW, it has specific speed regulation software (application), which starts sen-

sor work. Application itself is a very interesting one and specific one and one does not get a chance to deal with it often. First, we had to create an algorithm for control and protection of 500 kW engine. Afterwards, we installed reservoir sludge sensors and the ones for engine operation supervision. Speed of this powerful engine is regulated based on this information, and through set algorithm.

Whole project represented a special challenge for us as a company since this was the first time for us to deal with such big electrical engine plant.

In the frame of this project, we also supplied a transformer, frequency regulator and engine, as well as automation accessory equipment and equipment for supervision and control of the processes for commission of this engine.

Installation of this engine is demanding and risky. Most of the work has been done by us with provided technical support by the equipment supplier.

The second contract we signed refers to supply of substation on sleds and accessory lighting of old pit, video-surveillance and control of one 150 kW engine.



Frekventni regulator 500 kW / Frequent regulator 500 kW



Asinhroni motor 150 kW / Asynchrony engine 150 kW

Biosco CS

10 (20)/0,4 kV; snage do / rated 1000 kVA



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Izmještanje dalekovoda za potrebe TE Kostolac

Relocation of transmission line for needs of TPP Kostolac



Izgradnja novog industrijskog kolosijeka za potrebe Termoelektrane Kostolac je nametnula potrebu izmještanja i zaštite nadzemnih i podzemnih elektroenergetskih vodova, a obavljanje ovog posla je došlo u ruke konzorcijuma Elnos Grupa-Energoprojekt

Construction of new industrial gauge for needs of the Thermal power plant Kostolac asked for relocation and protection of overhead and underground electrical power lines. These works are entrusted to Consortium Elnos Group-Energoprojekt



Termoelektrana Kostolac / Thermal Power Plant Kostolac

SR Elnos Grupa kao dio konzorcijuma sa kompanijom Energoprojekt Beograd, obavlja radove izmještanja i održavanja dalekovoda koji su direktno vezani za nove potrebe rada Termoelektrane Kostolac.

Investitor ovog projekta su Elektroprivreda Srbije i Termoelektrane i kopovi Kostolac, a Elnos Grupa je glavni ugovarač projekta u ime konzorcijuma.

Potreba za realizacijom ovog posla je nastala u okviru nametnute dinamike rada Termoelektrane Kostolac, zbog koje je u planu izgradnja industrijskog kolosijeka koji će povezati termoelektranu sa mrežom pruga Železnica Srbije.

Zbog izgradnje novog kolosijeka, neophodno je izmještanje i zaštita nadzemnih i podzemnih elektroenergetskih vodova koji su u vezi sa postojećom elektroenergetskom infrastrukturom.

Tako je konzorcijum Elnos Grupa-Energoprojekt dobio zadatak da obavi djelimično izmještanje dalekovoda naponskog nivoa od 10 i 110 kV i prilagođavanja dalekovoda 400 kV novim uslovima eksploatacije.

Jedan dio radova je u potpunosti završen, a drugi je još uvijek u toku. Naime, zbog problema sa neriješenim vlasničkim odnosima na trasi nove pruge, radovi na dijelu dalekovoda 110 kV su trenutno obustavljeni, dok su svi radovi na 10 kV mreži okončani.

Inače, tokom realizacije projekta našli smo se pred izazovom, jer su radovi bili ograničeni specifičnim terminima za isključenje dalekovoda, što predstavlja izazov u smislu da je neophodno i veoma dobro uraditi pripremu za radove.

EN Elnos Group, being a part of consortium with company Energoprojekt Belgrade, executes works of relocating and maintenance of transmission lines, which are directly referring to new operation needs of the Thermal power plant Kostolac.

Investors of this project are Elektroprivreda Srbije and Thermal plants and cast mines Kostolac, and Elnos Group is the Main Contractor of the project on behalf of consortium.

Need for realization of this project resulted from imposed operation dynamics of the Ther-

mal power plant Kostolac. Due to this, construction of industrial gauge is planned. This gauge is going to connect thermal power plant with railway network Railway of Serbia.

Due to construction of new gauge, it is necessary to relocate and protect overhead and underground electrical power lines connected to the existing electrical power infrastructure.

So Consortium Elnos Group-Energoprojekt is tasked to perform partial relocation of the transmission line of voltage level from 10 and 110 kV and adjustment of transmission line 400 kV to new conditions of exploitation.

One part of works has been completely finished and the other one is still ongoing. Namely, due to issues of unsolved ownership relationships at section of new gauge, works of a part of transmission line 110 kV have currently been stopped, whereas all the works of 10 kV network were completed.

However, in project realization, we were challenged since the works were limited by specific deadlines for transmission line disconnection, which was a challenge in the view of need to perform preliminary works well.

Revitalizacija pet trafostanica vojvođanske regije

Revitalization of five substation in Vojvodina region

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Imali smo priliku da steknemo sasvim novo iskustvo u okviru specijalnog vida primjene mikroprocesorske zaštite na određenim postrojenjima u Elektrovojvodini – PAUSIT

We got a chance to acquire a completely new experience in the frame of special form of applying microprocessor protection on certain plants in Elektrovojvodina – PAUSIT

SR Elnos Beograd je putem sklapanja saradnje sa investitorom Elektrovojvodina Novi Sad ušao u zahtjevan projekat radova na održavanju pet trafostanica u vojvođanskom regionu.

Ovaj posao podrazumijeva obavljanje sveobuhvatnih radova zamjene opreme na trafostanicama: Bačka Palanka, Odžaci, Kikinda, Senta i Bačka Topola.

Preciznije govoreći, naš posao u okviru ovog projekta je podrazumijevao nabavku i isporuku opreme uz prethodno fabričko ispitivanje, snimanje postojećeg stanja, izradu tehničke dokumentacije, te zamjenu opreme.

Poslovi su suštinski obuhvatili ugradnju nove mikroprocesorske zaštite na 110 kV strani, zamjenu 110 kV prekidača sa ugradnjom novih NN signalnih kablova do kompletne rasklopne opreme.

Za nas je u okviru ovog projekta od velikog značaja što smo dugogodišnju saradnju sa Elektrovojvodinom proširili na još jednu značajnu oblast poslovanja – održavanje. Za početak poslova ovakve prirode, prvo je bilo neophodno da se upoznamo sa načinom rada Elektrovojvodine.

Imali smo jedinstvenu priliku da steknemo sasvim novo iskustvo sa specijalnim vidom primjene mikroprocesorske zaštite koji se primjenjuje na određenim postrojenjima u Elektrovojvodini, PAUSIT (ponovno automatsko uključuje-

nje spojnog i transformatorskog polja). Inače, Elektrovojvodina je za ovaj vid primjene zaštite dobila priznanje na državnom nivou.

Elektromontažni radovi u okviru ovog projekta počeli su u novembru prošle godine, a iako je ugovor potpisan za obavljanje poslova sa rokom od tri godine, svi radovi bi trebalo da budu okončani prije roka, odnosno već krajem naredne godine.

Ugovorom je predviđeno da posao traje tri godine zato što se radovi izvode u prekidima, odnosno u skladu sa mogućnostima Elektrovojvodine da obezbijedi beznaponsko stanje, kako bi se poslovi mogli obavljati u etapama.

EN Elnos Belgrade started a demanding project on maintenance of five substations in the Vojvodina region by concluding a contract with the Investor, Elektrovojvodina Novi Sad.

These works include performance of comprehensive works on replacement of the equipment in the following substations: Bačka Palanka, Odžaci, Kikinda, Senta and Bačka Topola.

To be more precise, our work within this project included purchase and delivery of equipment with prior factory testing, survey of the existing situation, making technical documentation and replacement of equipment.

Essentially works included installation of new

microprocessor protection on 110 kV, replacement of 110 kV switchers with installation of new LV signal cables to complete switchgear.

It is highly important for us that, within this project, we extended long-term cooperation with Elektrovojvodina to another important business field – maintenance. In order to start this type of works, it was necessary to get to know Elektrovojvodina way of operation in the first place.

We got a chance to acquire a completely new experience in the frame of special form of applying microprocessor protection on certain plants in Elektrovojvodina – PAUSIT (Automatic reclosing of bus coupler and transformer bay circuit breakers). Namely, Elektrovojvodina got recognition for application of this form of protection at the national level.

Electrical assembly works in the frame of this project started in November last year, and, even though the contract was signed for work performance for three years, all the works should be completed before deadline, i.e. as early as the end of the next year.

Contract defines that works should last for three years because the works are performed with breaks, i.e. in line with possibilities of Elektrovojvodina to provide off-line conditions in order to perform works in stages.



TS Bačka Palanka / SS Bačka Palanka

Redovno i interventno održavanje dalekovoda EMS-a

Regular and intervention maintenance of transmission lines of the EMS

SR Elnos Grupa je dugogodišnju saradnju sa JP Elektromreža Srbije (EMS) krunisala još jednim značajnim ugovorom, koji je mnogo više od nastavka, njegovanja i širenja saradnje. Ovim ugovorom EMS nam je ukazao povjerenje u veoma značajnoj oblasti održavanja objekata, segmentu poslovanja koji je od vitalnog značaja za pouzdan rad bilo kog sistema. Riječ je o poslu petogodišnjeg održavanja dalekovoda EMS-a na teritoriji Republike Srpske.

Elektromreža Srbije na teritoriji Republike Srpske ima dionice pet dalekovoda nazivnog napona 220 kV, jednog dvostrukog dalekovoda 110 kV i jednog dalekovoda 110 kV. Ukupna dužina ovih dalekovoda iskazano prema trasama je oko 134 km ili prema sistemu dalekovoda oko 153 km.

Prema ugovoru, na svim ovim dalekovodima Elnos Grupa će obavljati redovno i interventno održavanje u pomenutom periodu od pet godina. Značaj ovog projekta je veliki, jer će se ugradnjom nove opreme i sanacijom starih dijelova dalekovoda doprinijeti stabilnijem radu dalekovoda i sigurnijem prenosu električne energije.

Dalekovodi koje održavamo su dalekovodi 220 kV Vardište-HE Bistrica, TS Bajina Bašta-Pljevlja, TS Bajina Bašta-TS Sremska Mitrovica 2, TS Bajina Bašta-HE Bajina Bašta prvi vod i drugi vod, kao i dalekovodi 110 kV 106A/3, 106B/3 i 119/2. Do početka jula 2016. završeno je 50 odsto poslova iz oblasti redovnog održavanja.

EN Elnos Group crowned long-term cooperation with the PC Elektromreža Srbije (EMS) by another significant contract, which is more than continuation, care and expansion of cooperation. By this contract, EMS showed its confidence in a very significant field of maintenance of facilities – business segment of vital impor-



tance for reliable work of any system. It is five years' maintenance of EMS transmission lines in the territory of the Republic of Srpska.

Elektromreža Srbije in the territory of the Republic of Srpska has routes of five transmission lines of 220 kV nominal voltage, one double 110 kV transmission line and one 110 kV transmission line. Total length of these transmission lines according to routes is around 134 km or 153 km according to transmission line system.

According to the contract, Elnos Group shall perform regular and intervention maintenance of all these transmission lines in the aforementioned five years' period. Significance of this

project is big, since installation of new equipment and recovering of old parts of transmission lines are going to provide more stable transmission lines' work and safer transmission of electrical power.

These are the transmission lines to be maintained: 220 kV Vardište-HPP Bistrica, SS Bajina Bašta-Pljevlja, SS Bajina Bašta-SS Sremska Mitrovica 2, SS Bajina Bašta-HPP Bajina Bašta first and second duct, as well as the following transmission lines: 110 kV 106A/3, 106B/3 and 119/2. By beginning of July 2016, 50% of works in the frame of regular maintenance was completed.

Vanredna akcija

saniranja havarije

Extraordinary action of breakdown rehabilitation

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Havarija na DV 110 kV Pljevlja-Žabljak sanirana uz nadljudske napore dalekovodnih ekipa. Na gradilištu je bilo preko 130 elektromontera iz CGES-a i Elnos Grupe

Breakdown of TL 110 kV Pljevlja-Žabljak was recovered by superhuman efforts of transmission lines teams. More than 130 electrical fitters from CGES and Elnos Group were on the site

SR Zbog kombinacije više nepovoljnih klimatskih i meteoroloških pojava, 30. januara 2015. došlo je do velike havarije na dalekovodu 110 kV Pljevlja-Žabljak. Tada je 30.000 potrošača ostalo bez električne energije, pa je prioritet bio da se dalekovod vrati u funkciju.

Stručnjaci sa dugogodišnjim iskustvom u EPCG ocijenili su da ne pamte lošiji i razorniji splet vremenskih uslova po mrežu, kao i izuzetno velik broj oštećenja na njoj. Iz Crnogorskog elektroprenosnog sistema (CGES) su naveli da je na jednom dijelu, gdje su se i desili prekidi užadi usljed pojave leda na njima, dalekovod projektovan i izveden po znatno strožim standardima od propisanih. „No, to nije pomoglo, jer su vremenski uslovi bili takvi da su ledenice koje su se formirale imale prečnik i po nekoliko decimetara, što je desetak puta više od projektovanih vrijednosti“, naveli su iz te kompanije.

Da bi se sanirao, prethodno se kvar mora locirati, i to u uslovima povećanog bezbjednosnog rizika po ekipe usljed smanjene vidljivosti, intenzivnih padavina i teško pristupačnog terena. Ekipu Elnos Grupe predvodio je Miroslav Milošević, koji o ovoj vanrednoj akciji kaže: „Za mene, kao jednog od rukovodilaca na projektu, izazov je bio u organizaciji, jer je na gradilištu bilo preko 130 elektromontera iz CGES-a i Elnos Grupe. Visina snježnog pokrivača bila je od jednog do tri metra. Trpjeli smo jake udare vjetra, a pristup stubovima je bio moguć samo pomoću

ratraka (specijalnih vozila). Istakao bih veliku ulogu menadžmenta CGES-a, jer su nam u više navrata obezbjeđivali i helikopterske jedinice za podršku.“

Havarija je sanirana uz nadljudske napore dalekovodnih ekipa CGES-a i Elnos Grupe i pomoćnih radnika firme Raduč, asistenciju helikopterske jedinice i uz pomoć mještana. Zajedničkim naporima, koji su trajali osam iscrpljujućih dana, otklonjeno je preko 15 kvarova duž trase ovog dalekovoda.

EN Due to combination of more unfavorable climatic and meteorological conditions, on January 30, 2015 there was a big breakdown of 110 kV Pljevlja-Žabljak transmission line. At the time, 30,000 consumers were not provided with electrical power, so priority was to make it functional again.

Professionals of many years of experience in EPCG company said they did not remember worse and more devastating combination of weather conditions to affect the network, as well as extremely big number of its damages. People from the Electrical Power Transmission System of Montenegro (CGES) stated that transmission line was designed and performed in much severe standards than defined ones in a part where rope was cut due to presence of

ice on them. “But, it did not help since weather conditions were so bad that had created icicles has several decimeters in diameter, which was about ten times more than designed values”, the company reported.

In order to remove the failure, it should have been detected first. Those were conditions of increased safety risk for the teams due to decreased visibility, intensive precipitations and terrain difficult for access. Team from the Elnos Group was led by Miroslav Milošević, who said the following on this extraordinary action: “As for me, being one of the Project Managers, organization was a challenge since more than 130 electrical fitters from CGES and Elnos Group were on the site. Snow was from one to three meters deep. We suffered strong wind blows, and poles could be accessed only by special vehicles (Ratrak). I would like to stress a significant role of the CGES Management because they repeatedly provided us with helicopter support units.”

Breakdown was recovered by superhuman efforts of transmission lines teams from CGES and Elnos Group as well as laborers from company Raduč, helicopter unit support help from local population. More than 15 failure along this transmission line route were removed by joint efforts in the period of eight exhausting days.



DV 110 kV Pljevlja-Žabljak / TL 110 kV Pljevlja-Žabljak



Poslovna zgrada LUG LED / LUG LED Business building

LUG i Elnos Grupa Na putu tehnološkog razvoja

LUG and Elnos Group on the way of technological development

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LED rasvjeta rapidno zauzima mjesto tradicionalnih izvora rasvjete. Na ovom ekstremno dinamičnom tržištu, LUG i Elnos Grupa i u budućnosti će nastaviti posvećeno raditi na traženju i plasiranju novih rješenja

LED lighting rapidly replaces traditional light sources. In this extremely dynamic market, LUG and Elnos Group are going to continue to work on researching and publishing new solutions devotedly in future, too

SR Brzi razvoj LED tehnologije doveo je ne samo do promjene klasičnog shvatanja rasvjete i njene funkcije, već i do drastične promjene na tržištu. U relativno kratkih 10-ak godina, LED rasvjeta potisnula je klasičnu i ostvarila primat na evropskom tržištu. Iako tržište Balkana najspornije prati ovaj trend, potražnja naših kupaca za LED rasvjetom raste svakodnevno. Naša ponuda prati ove promjene. U ovom broju časopisa predstavimo jednog od naših vodećih dobavljača rasvjete – LUG, čiji vrhunski proizvodi prate i zadovoljavaju potrebe tržišta u svim segmentima profesionalne rasvjete.

LUG je globalni brend iz Poljske, čija rasvjetna tijela osvjetljavaju enterijere zgrada u više od 50 zemalja širom svijeta. Tri brenda LUG-a: LUG, LUGBOX i Flash & DQ, koncipirana su tako da

mogu uljepšati enterijer i eksterijer svakog domaćinstva i oživotvoriti najsofisticiranije ideje vodećih arhitekata.

Elnos Grupa je ekskluzivni zastupnik LUG-a na tržištu BiH već sedam godina. Imamo odličnu saradnju koja permanentno jača, jer su obje kompanije usmjerene na moderne tehnologije i stvaranje inovativnih rješenja na putu tehnološkog razvoja.

U ponudi Elnos Grupe najzastupljeniji brend LUG-a je profesionalna tehnička rasvjeta, koju odlikuju visoki tehnički parametri, energetska efikasnost i vrhunski dizajn. Najprodavaniji tipovi svjetiljki su industrijske vodotijesne svjetiljke, te rasteri za kancelarijske prostore. Ova rasvjeta oplemenila je mnogobrojne poslovne i administrativne zgrade, industrijske objekte,

prodajne salone, bolnice i škole. Poseban kuriozitet za našu saradnju jeste da je u prvoj zgradi u BiH koja je dobila energetske pasoše, DAF servis u Sarajevu, instalirana LUG rasvjeta. Naravno, LUG rasvjeta široko je zastupljena i u brojnim objektima u kojima Elnos Grupa radi instalaciju rasvjete.

Svoju široku zastupljenost i veliku popularnost LED rasvjeta duguje ogromnim uštedama koje omogućuje izuzetno dug vijek trajanja. Tako je kod naših kupaca veoma popularna i široka paleta Lug box proizvoda, koji su perfektna kombinacija visokih performansi, konkurentne cijene, jednostavne montaže i visoke dostupnosti.

Posebnu pažnju skrećemo na URBINO LED, novi top proizvod LUG-a iz oblasti profesionalne javne rasvjete sa LED izvorima svjetlosti. Mogućnost upravljanja ovom savremenom rasvjetom donosi ogromne uštede. Primjer za to imamo u gradu u kome je sjedište LUG-a, Zielona Gora, gdje je jedna od najvažnijih ulica osvijetljena ovim rasvjetnim tijelima. U poređenju sa ranije korištenom konvencionalnom rasvjetom, sa URBINO LED-om ostvarena je ušteda od 44 odsto.

Evidentno je da LED rasvjeta rapidno zauzima mjesto tradicionalnih izvora rasvjete. Na ovom ekstremno dinamičnom tržištu, LUG i Elnos Grupa i u budućnosti će nastaviti posvećeno raditi na traženju i plasiranju novih rješenja.

EN Rapid development of LED technology leads not only to change of classic comprehension of lighting and its function, but also to drastic change in the market. In a relatively short period of 10 years, LED lighting suppressed classic lighting and achieved primary place at the European market. Although Balkans market is the slowest in following in this trend, demand of our buyers for LED lighting is increasing on daily basis. Our offer follows in these changes. In this issue of magazine, we are going to present one of our leading suppliers of lighting - LUG, whose top quality products follow in and meet market

needs in all segments of professional lighting.

LUG is a global brand from Poland, whose luminaires provides light for interiors of facilities in more than 50 countries worldwide. Three LUG brands - LUG, LUGBOX and Flash & DQ, are designed in the way to decorate interior and exterior of each home and vivify the most sophisticated ideas of the leading architects.

Elnos Group has been an exclusive representative of LUG on BiH market for seven years. We have excellent cooperation, which permanently is getting stronger since both companies are oriented to modern technologies and creation of innovative solutions on the way of technological development.

The most often offer in Elnos Group by LUG is professional technical lighting, characterized by high parameters, energy efficiency and top quality design. The best-selling luminaires types are industrial watertight lamps, and raster for office premises. This lighting enriched many business and administrative buildings, industrial facilities, selling premises, hospitals and schools. Special curiosity for our cooperation is that LUG luminaires were installed in the first facility in BiH that got energetic passport, DAF service point in Sarajevo. Of course, LUG luminaires is extensively present in many facilities where Elnos Group performs lighting installation.

Its extensive presence and great popularity of LED lighting have been achieved due to enormous savings, which is provided by extremely long life. So, Lug box products are popular and

VISOKOAUTOMATIZOVANA PROIZVODNJA

PROCES PROIZVODNJE U LUG-U VISOKO JE AUTOMATIZOVAN NA JMODERNIJOM OPREMOM: CNC MAŠINAMA ZA OBRADU LIMA, AUTOMATSKOM LAKIRNICOM I ROBOTSKIM OŽIČAVANJEM SVJETILJKI. SVE SVJETILJKE SE ISPITUJU, A VRŠE SE I DETALJNA ISPITIVANJA SERIJA, KAO I SNIMANJA SVJETLOTEHNIČKIH PARAMETARA.

wide palette with our buyers. These are perfect combination of high performances, competitive price, easy assembly and high availability.

We would like to draw your special attention to URBINO LED, new LUG's top product in the field of professional public lighting with LED sources. Possibility of managing this modern equipment provides enormous savings. Example for this is in town where the Head Office of LUG is located, Zielona Gora. There, one of the most important streets is illuminated with these luminaires. In comparison to former used conventional lights, URBINO LED saves up to 44 per cent.

It is evident that LED light rapidly replaces traditional light sources. In this extremely dynamic market, LUG and Elnos Group are going to continue to work on researching and publishing new solutions devotedly in future, too.



HIGHLY-AUTOMATED PRODUCTION
PRODUCTION PROCESS IN LUG IS HIGHLY AUTOMATED WITH STATE-OF-ART EQUIPMENT: CNC MACHINES FOR SHEET PROCESSION, AUTOMATED PAINTING LINE AND ROBOT WIRING OF THE LUMINAIRES. ALL LUMINAIRES ARE TESTED. DETAILED TEST OF SERIES ARE ALSO PERFORMED AS WELL AS HIGH-TECH PARAMETERS LIGHTING.

Partnerstvo sa predznakom **ZAJEDNIČKOG RASTA**

Partnership for future joint growth



Jurij Zavgur, eksport i marketing menadžer / Jurij Zavgur, Export and Marketing Manager

Jurij Zavgur, eksport i marketing menadžer kompanije JSC Vents iz Kijeva, kaže da su za 12 godina od početka partnerstva sa Elnos Grupom, obje kompanije napredovale, proširile se i postale važni tržišni igrači. On za naš časopis govori o tome kako je saradnja dvije kompanije prešla put od malih godišnjih narudžbi do novog vremena sve većih poslova, u okviru kojih obje kompanije bilježe konstantan rast

Jurij Zavgur, Export and Marketing Manager of the company JSC Vents from Kiev, says that, in 12 years of partnership with Elnos Group, both companies expanded and became important market competitors. For our magazine, Zavgur speaks about cooperation of two companies and the path going from small annual orders to new ties of even bigger projects, where both companies note constant growth

SR Čime se bavi vaša kompanija i od kada postoji?

Kompanija Vents je počela sa radom početkom devedesetih, i to kao trgovačko preduzeće. Zaokret u vidu proširenja djelatnosti napravili smo 1997. godine, kada započinjemo vlastitu proizvodnju. U prvim godinama proizvodili smo ventilacione artikle za unutrašnje ukrajinsko tržište, a od 2000, Vents je startovao i sa proizvodnjom za izvoz, s tim da se kompanija u prvu ruku bazirala na rusko i poljsko tržište. Od tada pa sve do danas, Vents se razvio u velikog evropskog proizvođača, sa 100 odsto akcija u privatnom vlasništvu. Kompanija danas u svom vlasništvu posjeduje 120.000 m² proizvodnog i poslovnog prostora, zapošljava 2.100 radnika, koji rade u njenih 18 proizvodnih odjeljenja.

Predstavite nam ukratko vaš asortiman?

Vents je kompanija čiji je poslovni koncept „razvijati se svaki dan“. Uvijek smo spremni kupcu ponuditi nove proizvode i upravo njegove potrebe su nam na prvom mjestu. Širok asortiman od oko 10.000 proizvoda koji ima konstantnu tendenciju širenja s jedne strane pruža kompletan ventilacijski program postojećim i potencijalnim partnerima, a sa druge strane osigurava aktivnosti i investicije koje daju ekskluzivni proizvodi i tržišnu jedinstvenost. Važno je da naglasim i to da smo kompanija koja ima kapacitet i uvijek je spremna da razvija posebne proizvode za kupca, a naš proces proizvodnje ima sertifikat ISO 9001:2000.

Šta biste izdvojili kao vaše top-proizvode?

Mi smo firma koja razvija i promovira nekoliko sopstvenih brendova, a to su: Vents, Domovent, Kolibri, a proizvodimo i distribuiramo ih pod okriljem brendova našeg partnera EOM. Roba koju proizvodimo se može podijeliti u tri osnovne kategorije: ventilacijski proizvodi za domaćinstvo, industrijski i komercijalni ventilacioni proizvodi, te energetski efikasni ventilacijski proizvodi – artikli za raznovrsne instalacije, oni koji se odnose na velike i važne projekte – artikli koji su proizvedeni u skladu sa potrebama određenog projekta.

Dugo ste naš dobavljač. Kako biste ocijenili našu saradnju i tržište BiH?

Vents je započeo saradnju sa Elnos Grupom 2004. godine, i od početka zajedničkim naporima gradimo i postavljamo mrežu prodaje u BiH. Naše partnerstvo je počelo jednom malom narudžbom na godišnjem nivou, dok sada narudžbe Elnos Grupe dobijamo mjesečno. Upravo to pokazuje da Elnosov tim radi marljivo na tržištu BiH. Elnos Grupa je kompanija koja zna svoj posao i može da ga uradi počevši od samog početka. Vi ste kompanija koja je pouzdan partner i kojoj se bez ikakve sumnje može vjerovati.

Od proizvoda Vents-a, u ponudi Elnos Grupe najbolje su prodavani mali kućni ventilatori 100, 125 i 150 u različitim verzijama. Zatim, aksijalni ventilatori većih dimenzija, pogodni za ventilaciju proizvodnih i drugih hala. Za ove ventilatore dajemo i razne dodatke za olakšano upravljanje. Slijedi veoma dobro prihvaćena serija aluminijumskih fleksibilnih crijeva, te raznih dodataka za jedan ventilacioni sistem. Ukratko, sve ono što treba za jedan osnovni sistem ventilacije stana, kuće ili jednostavnijeg poslovnog objekta.

EN What does your company do and when it was established?

Company Vents started its work in early '90s as a trade company. Turnover being an expansion in activities happened in 1997, when we started our own production. In the first years, we produced ventilation items for national Ukrainian market and since 2000, Vents started export production, meaning Russian and Polish market at first. Since then up to now, Vents developed into big European producer with 100 per cent shares privately owned. Nowadays, company has own 120,000 m² of production and business premises, it employs 2,100 employees working in its 18 production departments.

Would you introduce us to your production assortment briefly?

Vents is a company with following business concept: “develop every day”. We are always ready to offer new products to our buyer and buyer’s needs are primary to us. Rich assortment of about 10,000 products having constant expansion tendency, on one hand, offers ventilation program to the existing and possible partners, and on the other hand, ensures activities and investments providing by exclusive products and marketing distinctiveness. It is important to mention that we are the company with capacity and always ready to develop special

products for the buyer, and our production process has ISO 9001:2000 Certificate.

What would be your top products?

We are the company developing and promoting several own brands such as: Vents, Domovent, Kolibri, and we produce and distribute them under the brands of our partner EOM. Goods we produce could fall into three main categories: household ventilation products, industrial and commercial ventilation products, as well as energy efficient ventilation products – items for various installations, those referring to big and significant projects – items produced in line with needs of specific project.

You have been our supplier for long time. What is your opinion on our cooperation and BiH market?

Vents started cooperation with Elnos Group in 2004. From the beginning, we build and set sales network in BiH by joint efforts. Our partnership started by a small order on annual level, where we get orders from Elnos Group on monthly basis. This is a proof that team from Elnos works hardly in BiH market. Elnos Group is a company that knows how to do its work and can perform it from the very beginning. You are a reliable partner and a trustworthy company.

As for Vents products, Elnos Group sells small household ventilators 100, 125 and 150 in different versions best. Then, we have axial ventilators of bigger dimensions, appropriate for ventilation of production and other halls. We also provide various add-ins for easier control of these ventilators. Then we have a very well accepted series of aluminum flexible hoses, as well as various add-ins for a ventilation system. Briefly, we have everything necessary for a basic ventilation system of an apartment, house or simpler business facility.



Biosco CS trafostanice obezbjeđuju razvoj savremene mreže

Biosco CS substations provide development of modern network



Istovar Biosco CS trafostanice / Unloading of Biosco CS transformer station

Za Elektrovojvodinu je u toku realizacija ugovora za 33 Biosco CS trafostanice po principu 'ključ u ruke', dok smo sa ED Centrom Kragujevac okončali posao proizvodnje i isporuke pet daljinski upravljivih Biosco CS trafostanica

Currently, we are performing a contract for Elektrovojvodina for 33 Biosco CS substations per 'turn-key' principle, whereas we completed production and delivery project for five remote controlled Biosco CS substations with EPD Centar Kragujevac

SR Fabrika prefabrikovanih distributivnih betonskih trafostanica Elnos Beograd, kao jedini licencirani partner Schneider Electric-a za proizvodnju Biosco CS trafostanica u regiji, u proteklom periodu dogovorila je realizaciju dva značajna projekta.

U okviru prvog ugovora, Elnos Beograd je kroz partnerstvo sa Elektrovojvodinom, a po principu 'ključ u ruke', dogovorio proizvodnju, isporuku i puštanje u rad 33 Biosco CS trafostanice.

Radi se o poslu u kome zaokružujemo cijeli ciklus, od proizvodnje pa sve do realizacije projekta na terenu.

„Do sada smo u okviru ovog ugovora okončali posao na ukupno 22 trafostanice. Projekat napreduje dobrom dinamikom, tako da bismo ga trebali završiti krajem godine, što je osam mjeseci prije predviđenog roka“, objasnio je Lazar Zelenović, rukovodilac proizvodnje Biosco CS transformatorskih kućica. Drugi ugovor smo sklopili sa ED Centrom

Kragujevac, a naš posao obuhvata proizvodnju i isporuku pet daljinski upravljivih Biosco CS trafostanica.

Radi se o Biosco CS trafostanicama koje su u potpunosti automatizovane, čime je obezbijeđen savremen razvoj i uvođenje u daljinsko upravljanje sekundarne distributivne mreže. Rad ovih Biosco CS trafostanica, koje su dio ugovora sa ED Centrom Kragujevac, pokriva područje centralne Srbije, odnosno područja Smedereva, Požarevca i Kragujevca.

„U ove Biosco CS trafostanice su ugrađeni posebni elementi kako bi se njima moglo upravljati iz dispečerskog centra, tako da se daljinski upravlja njihovim uključanjem, isključenjem i monitoringom“, rekao je Zelenović.

Inače, Biosco CS trafostanice su standardizovani tipski testirani proizvod koji omogućava jednostavno, optimalno i bezbjedno korištenje mreže, dok upravljivi sistem obezbjeđuje kontinuirano napajanje, zadovoljne

BIOSCO CS TRAFOSTANICA U POŽAREVCU

JEDNA OD BIOSCO CS TRAFOSTANICA KOJE SMO RADILI SA ED CENTROM KRAGUJEVAC JE URAĐENA I U POŽAREVCU. NJENOM INSTALACIJOM PROŠIRENA JE MREŽA ELEKTRODISTRIBUCIJE POŽAREVAC I OBEZBIJEĐENO PRIKLJUČENJE VELIKOG BROJA STAMBENIH I STAMBENO-POSLOVNIH OBJEKATA. INVESTITOR JE IZABRAO TIP KOMPAKTNE BETONSKE TRAFOSTANICE BIOSCO CS, ZBOG IZUZETNO MALOG PROSTORA KOJI JE BIO NA RASPOLAGANJU ZA IZGRADNJU. OVA TRANSFORMATORSKA STANICA ARMIRANO-BETONSKE KONSTRUKCIJE U OSNOVI IMA DIMENZIJE 2,8 X 2,38 METARA I VISINU OD 2,42 METRA, A NAKON UGRADNJE VISINA IZNOSI 1,67 METARA.

korisnike i precizno praćenje parametara mreže, odnosno stabilnu mrežu i bilans između potrošnje i proizvodnje.

EN Factory for prefabricated distributive concrete substations Elnos Belgrade, being the only licensed partner of Schneider Electric for production of Biosco CS substations in region, performed two significant projects in the past period.

In the frame of this contract, Elnos Belgrade contracted production, delivery and commission of 33 Biosco CS substations through partnership with Elektrovojvodina per 'turn-key' principle.

This is a project with completed cycle – from production to realization of the project in the field.

“So, far, in the frame of this contract, we completed works of 22 substations in total. Project is going with good dynamics so we should finish it by the end of year, which is eight months before scheduled deadline”, explained Lazar Zelenović, Production Manager in Biosco CS transformer housings.

We signed another contract with EPD Centar Kragujevac, and our works include production and delivery of five remote controlled Biosco CS substations.

These are completely automatic Biosco CS substations, which provide modern development and introduction to remote control of secondary distributive network. Work of these Biosco CS substations, which are a part of contract with EPD Centar Kragujevac, covers Central Serbia, i.e. Smederevo, Požarevac and Kragujevac regions.

“These Biosco CS substations have special elements installed in order to control them from the dispatcher center, so their turning

BIOSCO CS SUBSTATION IN POŽAREVAC

ONE OF BIOSCO CS SUBSTATIONS THAT WE PERFORMED IN COOPERATION WITH EPD CENTAR KRAGUJEVAC WAS PERFORMED IN POŽAREVAC. ITS INSTALLATION EXPANDED NETWORK OF ELECTRICAL UTILITY OF POŽAREVAC AND PROVIDED CONNECTION TO A LARGE NUMBER OF DWELLING AND DWELLING-BUSINESS FACILITIES. INVESTOR SELECTED A COMPACT CONCRETE BIOSCO CS SUBSTATIONS TYPE DUE TO EXTREMELY SMALL SPACE AVAILABLE FOR CONSTRUCTION. THIS REINFORCED CONCRETE SUBSTATION HAS A BASE DIMENSIONS 2.8 X 2.38 METER AND IS 2.42 METER HIGH, AND AFTER INSTALLATION, THE HEIGHT WAS 1.67 METER.

on and off, as well as monitoring are remote controlled”, said Zelenović.

Likewise, Biosco CS substations are standardized tested products that provide simple, optimum and safe usage of network, whereas controllable system provides continuous power, satisfied consumers and precise monitoring network parameters, i.e. stable network and balance between consumption and production.



Montaža krovnog segmenta / Assembly roof segment



Izrada betonskog elementa / Production of concrete elements

Naši proizvodi su dio najvećih **energetskih postrojenja** **u regionu**

Our products are parts of the biggest electrical power plants in region



SR Sa idejom da je uvijek neophodno razvijati posao i usklađivati rad sa sve složenijim zahtjevima tržišta i novim potrebama investitora, Elnos Grupa je formirala elektromontažne radionice (EMR) u sektoru proizvodnje u Banjaluci i Beogradu. Ovaj sektor se već godinama uspješno bavi projektovanjem, montažom i ugradnjom različitih vrsta ormara relejne zaštite i upravljanja, te razvodnih ormara.

Ove dvije radionice su za 10 godina posto-

janja u Banjaluci i četiri u Beogradu, postigle veliki uspjeh, a razvodni ormari koje u njima proizvodimo su danas dio najvećih regionalnih elektroenergetskih postrojenja.

TOP-PROIZVOD ORMAR ZAŠTITE I UPRAVLJANJA

U okviru kompletnog portfolia proizvodnje elektromontažnih radionica, vremenom se kao top-proizvod izdvojio ormar zaštite i upravl-

janja, koji isporučujemo za potrebe elektroenergetskih i industrijskih postrojenja. U ormare ovog tipa ugrađujemo dijelove renomiranih svjetskih proizvođača kao što su: Rittal, Siemens, ABB, Schneider, SEL i Phoenix. Rad radionica je obilježen i maksimalnom podrškom našeg projektnog biroa, koji projektuje ove ormare. Veliko nam je zadovoljstvo što smo trudom i uz podršku projektnog biroa tržištu uspješno ponudili proizvod veoma visokog kvaliteta.

BANJALUČKI SREDNJOŠKOLCI POHAĐAJU PRAKSU U EMR-U

POSLEDNJIH NEKOLIKO GODINA NA PRAKSU U EMR DOLAZE UČENICI IZ ŠKOLE UČENIKA U PRIVREDI I ELEKTROTEHNIČKE ŠKOLE. U NAŠIM RADIONICAMA UČENICI IMAJU MOGUĆNOST DA SVOJE TEORETSKO ZNANJE POVEŽU SA PRAKTIČNIM ISKUSTVOM, A MI U OKVIRU SVAKODNEVNOG PROCESA RADA NASTOJIMO DA ĐACIMA POMOGNEMO DA KROZ VJEŽBU OSTVARE SVOJU PRAKSU. NERIJETKO SMO BILI ZADOVOLJNI NJIHOVOM AMBICIJOM DA NEŠTO POSTIGNU I ČINJENICOM SA KAKVOM SU VOLJOM ULAZILI U SVAKI NOVI PROJEKAT, TAKO DA SU NEKI OD NJIH DANAS RADNICI NAŠE KOMPANIJE.

ELEKTROMONTAŽNA RADIONICA BEOGRAD

U prethodnom periodu u elektromontažnoj radionici u Beogradu realizovan je projekat FAT za trafostanicu Srbobran 400/110 kV, što je posao u okviru kojeg smo zajedno sa kolegama iz Elektromreže Srbije ispitali ormare zaštite i upravljanja na 45 ormara.

Pored toga, za ovu trafostanicu je montiran kompletan SCADA sistem, nakon čega je izvršena simulacija svih kvarova, provjera veza, provjera signalizacije i upravljanja. Ukratko, na ovom poslu smo simulirali kompletnu trafostanicu u radionici, što uveliko skraćuje rok njenog puštanja u rad na terenu.

Izdvojicemo ormare urađene za još nekoliko značajnih projekata. Prije svega, to su ormari upravljanja i zaštite u polju za HE Zvornik, zatim ormari upravljanja i zaštite, kao i ormari sopstvene potrošnje i ormar alarma za TS Požega 4. Takođe, urađeni su ormari sopstvene potrošnje za TS Pljevlja 2, za izradu čijih kompleksnih bakarnih veza je trebalo dosta umijeća.

ELEKTROMONTAŽNA RADIONICA BANJALUKA

EMR Banjaluka se za potrebe različitih postrojenja, već uspješno izborila sa velikim izazovima. Jedan od takvih poslova je bio izrada velikih sabirničkih sistema 2500 A i 3200 A na projektima „Dubicotton“ i „Grand Trade“. Ugradnja paralelnih sabirničkih sistema i njihovo povezivanje sa opremom je jedan od poslovnih izazova koji se dugo pamte.

Pored ovoga, kao jedan od najzahtjevnijih projekata, možemo izdvojiti posao izrade ormara za potrebe TE Stanari, a kojeg intere-

santnim čini veliki broj različitih tipova ormara koje smo proizveli.

PROIZVODI NAŠIH RADIONICA SU SASTAVNI DIO REGIONALNIH ENERGETSKIH POSTROJENJA

Veliko nam je zadovoljstvo što znamo da Elnos ormari danas rade u objektima kao što su TE Stanari, HE Bočac, TE Ugljevik, HE Bajina Bašta, HE na Trebišnjici, TS Vranje i mnoga druga.

NOVA OPREMA ZA NOVE IZAZOVE

Rad na sve zahtjevnijim projektima u proteklom periodu nam je sam po sebi nametnuo potrebu nabavke nove opreme, sa kojom smo spremni odgovoriti tim izazovima.

Tako smo u proteklom periodu u EMR Banjaluka nabavili specijalnu mašinu za savijanje i bušenje bakarnih sabirnica renomiranog proizvođača Alfa. Za potrebe povećanja pouzdanosti i preventive kvarova na postrojenjima nabavljena je termovizijska kamera Flir, a zbog sve češće montaže i ispitivanja raznih UPS sistema, nabavili smo ispitni uređaj GAUS.

Važno je napomenuti i to da u proizvodnji primjenjujemo postupak termovizacije, odnosno savremenu metodu za kontrolu stanja opreme i monitoringa na licu mjesta.

OD RADIONICE DO TERENA

Elektromontažne radionice su ogledalo Elnosa, kao sinteza rada skoro svih sektora kompanije, od prodaje, preko inženjeringa, pa do logistike.

Posao u našim radionicama se nikako ne završava u samoj radionici. On podrazumijeva i aktivno učešće u montaži ormara koje proizvodimo, na terenu. Uvijek nastojimo da naši proizvodi zadovolje visoke kriterijume kvaliteta i pouzdanosti, što je upravo jedan od glavnih faktora koji nas u ovom segmentu rada i izdvaja na tržištu.

Smatramo da budućnost elektromontažnih radionica najvećim dijelom leži u mladim ljudima koji su sastavni dio ovog tima, i koji svojim konstantnim usavršavanjem daju poseban pečat svakom proizvodu koji se u njima napravi. Naš zadatak je da i u narednom periodu svojom inventivnošću i radom osvojimo nova tržišta.

EM Elnos Group established electrical assembly workshops (EAWS) in the production sector in Banja Luka and Belgrade with an idea of constant need to develop business and harmonize the work with more complex market requests and new needs of investors. For years, this sector has been successful in designing, assembly and installation of various types of cabinets for

relay protection and control, as well as distribution cabinets.

For 10 years of existence in Banja Luka and four years in Belgrade, these two shops achieved a great success and distribution cabinets we produce in there are parts of the biggest regional electrical power plants today.

TOP-PRODUCT-CABINET FOR PROTECTION AND CONTROL

In the frame of entire portfolio of production in the electrical assembly workshops, in time, cabinet for protection and control set itself aside as a top-product. These are being provided for needs of electrical power and industrial plants. These types of cabinets consist of parts produced by renowned world producers such as: Rittal, Siemens, ABB, Schneider, SEL and Phoenix. Workshop activity is also featured by maximum support by our designing office, which makes design for these cabinets. It is our great pleasure to offer a product of high quality to the market through efforts and support by the designing office.

ELECTRICAL ASSEMBLY WORKSHOP BELGRADE

In the previous period, electrical assembly workshop in Belgrade performed project FAT for substation Srbobran 400/110 kV, where, together with colleagues from Elektromreža Srbije, we tested cabinets for protection and control for 45 cabinets.

Apart from this, entire SCADA system was

BANJA LUKA STUDENTS OF HIGH SCHOOLS ATTEND PRACTICAL EDUCATION IN EAWS

IN THE PAST FEW YEARS, EAWS HAS BEEN VISITED BY STUDENTS FROM APPRENTICE SCHOOL AND ELECTRICAL ENGINEERING SCHOOL. IN OUR WORKSHOPS, STUDENTS ARE PROVIDED WITH POSSIBILITY TO LINK THEIR THEORETICAL KNOWLEDGE WITH PRACTICAL EXPERIENCE, AND WE TEND TO HELP STUDENTS ACQUIRE THEIR PRACTICE THROUGH EXERCISING IN THE FRAME OF EVERYDAY PROCESS. WE OFTEN WERE SATISFIED BY THEIR AMBITION TO ACHIEVE SOMETHING AND THE FACT THEY ENTER WITH IN EACH INDIVIDUAL PROJECT, SO SOME OF THEM ARE EMPLOYEES IN OUR COMPANY NOWADAYS.

installed for this substation. Afterwards, simulation of all faults, test of connections, signalization and control was performed. Briefly, we simulated entire substation in the workshop for this project, which largely decreases period of its commission in field.

We would like to set aside cabinets performed for some other important projects. First of all, those are cabinets for protection and control in the bay for HPP Zvornik, then cabinets for protection and control, as well as cabinets for local consumption and alarm cabinet for SS Požega 4. Likewise, we made cabinets for local consumption for SS Pljevlja 2, and performance of its complex copper connection asked for a lot of skill.

ELECTRICAL ASSEMBLY WORKSHOP BANJA LUKA

EAWS Banja Luka has already successfully overcome big challenges for needs of various plants. One of these projects was performance of bus bar systems 2500 A and 3200 A on works of "Dubicotton" and "Grand Trade". Installation of parallel bus bar systems and their connection to the equipment is one of business challenges to remember for a long time.

Apart from this, being one of the most demanding projects, we could mention performance of cabinets for TPP Stanari. It is interesting due to the fact that we made a big number of different cabinets we had connected.

PRODUCTS OF OUR WORKSHOPS ARE CONSTITUENT PART OF REGIONAL ELECTRICAL POWER SYSTEM PLANTS

It is our big pleasure to know that Elnos cabinets nowadays are functional in facilities such as TPP Stanari, HPP Bočac, TPP Ugljevik, HPP Bajina Bašta, HPP Trebišnjica, SS Vranje and in many others.

NEW EQUIPMENT FOR NEW CHALLENGES

Working on more demanding projects in the previous period itself imposed necessity of purchasing new equipment that would help us face those challenges.

So, in the previous period, we purchased special machine for bending and drilling copper bus bars of renowned producer Alfra in EAWS Banja Luka. In order to increase reliability and to prevent faults in plants, we acquired thermal vision camera Flir. Due to more often assembly

and testing of UPS systems, we purchased test device GAUS.

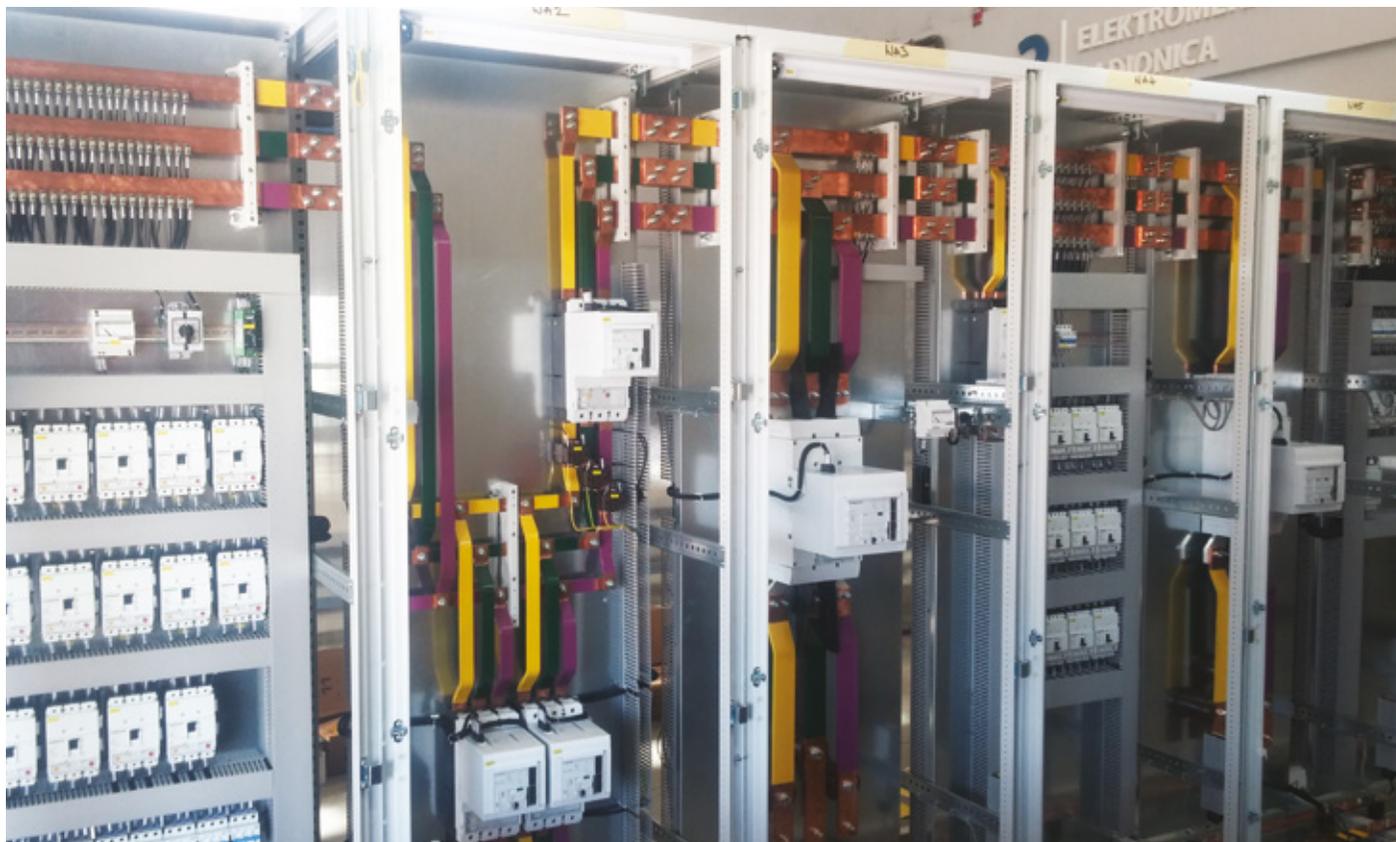
It is also important to mention that we apply procedure of thermal vision in production, i.e. modern method for control of equipment state and monitoring at the very location.

FROM WORKSHOP TO FIELD

Electrical assembly workshops are Elnos's mirror, being a synthesis of work of almost all sectors of the company – from sales through engineering to logistics.

Works of our workshops does not finish in workshops themselves. It also understands active participation in field installation of cabinets we produce. We always tend to have our products satisfy high criteria of quality and reliability, which, actually, is one of the main factors that sets us aside on the market in this work segment.

We believe that future of electrical assembly workshops mostly lies in young people being parts of this team. They provide a special touch to each of the products made there by their constant improvements. It is our task to win new markets by our inventiveness and work in the upcoming period, too.



STRUČNA SAVJETOVANJA

//////////////////// C O U N S E L I N G //////////////////////

SR ELNOS GRUPA UČESNIK PRESTIŽNE KONFERENCIJE U MANČESTERU

Na poziv ambasade Velike Britanije u Bosni i Hercegovini, Elnos Grupa je učestvovala na prestižnoj konferenciji „EIC Connect Energy 2015“. Konferencija je bila posvećena mogućnostima i rješenjima u oblasti električne i nuklearne energije i obnovljivih izvora energije. Ovaj dvodnevni događaj održan je krajem novembra 2015. godine u Mančesteru.

Konferencija je i ove godine bila odlična platforma za predstavljanje britanskih i preko 30 vodećih svjetskih energetske kompanija stručnoj i poslovnoj javnosti. Na ovom jedinstvenom događaju, Elnos Grupu i njen portfolio predstavili su izvršni direktor Elnosa BL Banjaluka Branko Torbica i Miroslav Tuvic, direktor sistemske prodaje.

Dobro organizovan i ugodan događaj ponudio je velike mogućnosti za umrežavanje u relevantnim poslovnim sektorima, koji je u praksi rezultirao sa preko 400 'jedan-na-jedan' sastanaka.



Branko Torbica na konferenciji u Mančesteru / Branko Torbica on the conference in Manchester

EN ELNOS GROUP PARTICIPATED IN PRESTIGE CONFERENCE IN MANCHESTER

Invited by the Embassy of the Great Britain in Bosnia and Herzegovina, Elnos Group participated in prestige conference “EIC Connect Energy 2015”. Conference was devoted to possibilities and solutions in the field of electrical and nuclear power and renewable energy sources. This two-day event was held at the end of November 2015 in Manchester.

Again, this year, the Conference was a good platform for presentation of British and over 30 world leading electrical power companies to professional and business public. In this unique event, Elnos Group and its portfolio were presented by Mr. Branko Torbica, the Executive Director of Elnos BL Banjaluka, and Mr. Miroslav Tuvic, the Director of System Sale Department.

Well organized and pleasant event offered large possibilities for networking in relevant business sectors, which practically resulted in over 400 'one to one' meetings.

SR DEVETO SAVJETOVANJE MAKO CIGRE

Deveta konferencija MAKO CIGRE (Makedonski nacionalni komitet Međunarodnog savjetovanja za velike električne mreže), održana je u hotelu Metropol na Ohridu, od 27. do 29. septembra 2015. godine. Elnos Grupa bila je sponzor svečanog otvaranja savjetovanja.

Tradicionalno savjetovanje MAKO CIGRE i ove godine je opravdalo status izvrsnog događaja koji okuplja predstavnike energetske sektora u Makedoniji i regionu, sve učesnike akademske zajednice, industrije, energetske kompanija i drugih zainteresovanih strana. Više stotina učesnika pridonijelo je zajedničkoj misiji organizatora i učesnika – razmjenu znanja i iskustava u vezi sa svim važnim pitanjima u energetske sektoru. Na prošlogodišnjoj konferenciji i MAKO CIGRE je aktivno učestvovao prezentujući svoje radove.

Tokom savjetovanja MAKO CIGRE, Elnos BL d.o.e.l. Skopje organizovao je druženje povodom jubileja pet godina uspješnog poslovanja.

EN NINTH COUNSELING MAKO CIGRE

Ninth conference MAKO CIGRE (Macedonian National Committee of the International Council on Large Electric System), was held in the Hotel Metropol in Ohrid from September 27th to 29th 2015. Elnos Group was a sponsor of the opening ceremony.

Even this year, the traditional counseling MAKO CIGRE justified its status of extraordinary event gathering representatives of electrical power sector in Macedonia and region, all the participants of academic community, industry, electrical power companies and other interested parties. Several hundred of participants contributed joint mission of organizers and participants – exchange of knowledge and experience in the reference to all important issues in electrical power sector. In last year conference, MAKO CIGRE also participated actively and presented its activities.

During counseling MAKO CIGRE, Elnos BL d.o.e.l. Skopje organized a reception for the jubilee of five years of successful business operation.

SR ELNOS GRUPA NA 32. SAVJETOVANJU CIGRE SRBIJA

Na Zlatiboru je od 17. do 21. maja 2015. godine održano 32. savjetovanje CIGRE 2015, koje tradicionalno organizuje Srpski nacionalni komitet Međunarodnog savjetovanja za velike električne mreže (CIGRE). I ovaj put, Elnos Grupa je podržala savjetovanje kao učesnik i sponsor.

Savjetovanje je otvorio mr Gojko Dotlić, predsjednik CIGRE Srbija, u prepunoj kongresnoj sali hotela Mona. Dotlić je tada istakao da je prema ocjeni mnogih savjetovanje CIGRE Srbija najznačajniji skup elektroenergetičara, ali i drugih struka koje prate razvoj elektroenergetike uopšte, kako na domaćem tako i na regionalnom nivou.

Savjetovanje za velike električne mreže je i ove godine potvrdilo status najznačajnijeg događaja za transfer tehničkih znanja i informacija od opšteg interesa. Najaktuelnije teme su bile posljedice velike havarije u elektroenergetskom sistemu Srbije tokom poplava, olujnih vjetrova, ledene kiše i snijega 2014. godine i liberalizacija tržišta električne energije u Srbiji i njegovog budućeg razvoj.

Tradicionalno su tokom savjetovanja održane poslovne prezentacije i tehničke izložbe vodećih kompanija iz oblasti elektroenergetike. Elnos Grupa je aktivno učestvovala u ovim aktivnostima. Naša prezentacija održana je u prepunoj kongresnoj sali hotela Palisad, gdje smo se predstavili najnovijim segmentima iz našeg bogatog portfolija, najnovijim referencama i tekućim projektima.

Značaju ovog savjetovanja doprinosi i činjenica da je na njemu učestvovalo preko 1.000 naučnih i stručnih radnika elektroprivrede, elektroindustrije, instituta, fakulteta i projektnih firmi iz Srbije, Republike Srpske i zemalja okruženja. Tokom savjetovanja predstavljeno je 170 radova u okviru studijskih komiteta.

EN ELNOS GROUP ON 32nd COUNSELING OF CIGRE SERBIA

32nd counseling CIGRE 2015 was held on the Mountain Zlatibor from May 17 to May 21, 2015. This event is traditionally organized by the Serbian National Committee of the International Council on Large Electric System (CIGRE). Again, Elnos Group supported the counseling both as participant and sponsor.

Counseling was opened by Gojko Dotlić, M.A. and President of the CIGRE Serbia, in full conference hall of the Hotel Mona. At the opening, Dotlić emphasized that, as seen by many, counseling by CIGRE Serbia is the most important meeting of electrical power specialists but also of other specialists following in development of electric power system in general, both on domestic and regional level.

Once again, counseling for large electric networks this year confirmed the status of the most important event for transfer of technical knowledge and information of general interest. The most current topics



Prezentacija Elnos Grupe na Zlatiboru / Elnos Group presentation on Zlatibor

were hazardous consequences of large breakdown in electric power system of Serbia during floods, storms, icing rain and snow in 2014 as well as liberalization of the electrical power market in Serbia and its future development.

Traditionally, business presentations and technical exhibitions of the leading companies in the field of the electric power system were held within counseling. Elnos Group actively took part in all these activities. Our presentation was held in full conference hall of the Hotel Palisad, where we introduced us through latest segments in our rich portfolio, latest references and current projects.

Importance of this counsel is also backed up by the fact that over 1,000 scientific and professional staff of electric power industry, institute, faculty and designing companies from Serbia, Republic of Srpska and surrounding countries took part in it. On the counseling, 170 works were presented within the study committee.

SR ELNOS INŽENJERING PODGORICA POKROVITELJ IV SAVJETOVANJA CG KO CIGRE

Crnogorski komitet Međunarodnog vijeća za velike električne mreže CG KO CIGRE organizovao je četvrto savjetovanje o velikim električnim mrežama. Savjetovanje je održano u Igalu, u periodu od 11. do 14. maja prošle godine. Elnos Inženjering iz Podgorice je ovu manifestaciju podržao kao pokrovitelj svečanog otvaranja.

IV savjetovanje CG KO CIGRE otvorio je Vladimir Kavarić, ministar ekonomije u Vladi Crne Gore. U toku ceremonije otvaranja, Aleš Kregar iz ELES-a (Slovenija) održao je predavanje na temu „Uticaj daljevodova na okolinu, zakonodavstvo i iskustva“. Na savjetovanju se okupio veliki broj stručnjaka iz zemlje i regiona, stručnoj javnosti su prezentovana najnovija znanja i iskustva iz oblasti elektroenergetike, kroz 106 referata sa aktuelnim temama koje je definisalo 15 studijskih komiteta.

U okviru savjetovanja održana su i tri okrugla stola, na kojima su se učesnici bavili pitanjima budućnosti crnogorske elektroenergetike, smanjenju gubitka na prenosnoj i distributivnoj mreži, kao i pitanjima energetske efikasnosti. Iznesen je zaključak s kojim se složila većina prisutnih, a to je da su prioriteti energetske politike Crne Gore sigurnost u snabdjevanju energijom, razvoj konkurentnog tržišta, te stvaranje uslova za održivi energetski razvoj.

EN ELNOS ENGINEERING PODGORICA IS SPONSOR OF 4TH COUNSELING OF MONTENEGRO CG KO CIGRE

Montenegro National Committee of the International Council on Large Electric System CG KO CIGRE organized the Fourth counseling on large electronic systems. Counseling was held in Igalu in the period from May 11 to May 14 last year. Elnos Engineering from Podgorica supported this event as the sponsor of the opening ceremony.

Fourth counseling CG KO CIGRE was opened by Vladimir Kavarić, the Ministry of Economics in Montenegrin Government. In the opening ceremony, Aleš Kregar from ELES (Slovenia) gave a lecture on “The impact of transmission lines on the environment, legislation and experience“. A large number of experts, local and regional, gathered on this event. Professionals were introduced to the latest knowledge and experience in the field of electrical power system through 106 reports of current topics defined by 15 study committees.

There were three round tables organized at the Counseling as well. Participants discussed issues of the future of the Montenegrin electrical power system, loss decrease in transmission and distributive network, as well as issues of power efficiency. There was a conclusion which was adopted by most present, i.e. priorities of power system politics in Montenegro are reliability in power supply, development of competition market, as well as creation of conditions for sustaining power system development.

**SR ELNOS GRUPA PODRŽALA
"JAHORINA EKONOMSKI FORUM 2016"**

Udruženje ekonomista Republike Srpske – SWOT je, pod pokroviteljstvom predsjednika Republike Srpske, 20. i 21. aprila u hotelima "Termag" i "Vučko" na Jahorini, organizovao prvi "Jahorina ekonomski forum 2016".

Forum su otvorili Saša Grabovac, izvršni direktor Udruženja ekonomista RS – SWOT i Milorad Dodik, predsjednik Republike Srpske.

Skup je kroz plenarnu sjednicu i sedam panel diskusija ponudio uvide u novi svjetski ekonomski poredak, savremene trendove u makroekonomskim politikama velikih i manjih država, geopolitičkim uslovima i posljedicama fluktuacije cijena sirovina na međunarodnom tržištu, kao i o opredjeljenju zemalja zapadnog Balkana za razvoj realnog sektora, te odgovorio na druga aktualna pitanja i otvorio mnogo novih.

Forum je okupio više od 300 domaćih i stranih privrednika, finansijskih stručnjaka, akademika, univerzitetskih profesora, zvaničnika RS i BiH, te predstavnika diplomatskog kora. Elnos Grupa je jedan od sponzora i učesnika ovog značajnog foruma.

**EN ELNOS GROUP SUPPORTED
"JAHORINA ECONOMIC FORUM 2016"**

Association of economists of the Republic of Srpska – SWOT – organized the first "Jahorina Economic Forum 2016" sponsored by the President of the Republic of Srpska on April 20 and 21 in hotels "Termag" and "Vučko" on Jahorina.

Forum was opened by Saša Grabovac, Executive Director of the RS Association of economists– SWOT and Milorad Dodik, the President of the Republic of Srpska.

Through plenary meeting and seven panel discussions, the congress offered insights in new world economic order, modern trends in macroeconomic policies of big and small states, geopolitical circumstances and consequences by fluctuation of raw materials' prices on international market, as well as commitment of the West Balkans countries to development of real economy, and answered to other current questions and opened many new ones. Forum gathered more than 300 national and international entrepreneurs, financial experts, academics, university professors, RS and BiH officials, as well as representatives of diplomatic corps. Elnos Group is one of the sponsors and participant of this important forum.

**SR ELNOS GRUPI
PRIZNANJE NA 3. BIZNIS
KONFERENCIJI BEES 2015**

Treća cjelodnevna Biznis konferencija BEES 2015 „Razvoj tržišta energetske efikasnosti kroz nove modele finansiranja“, održana je 15. decembra 2015. godine u Sava centru u Beogradu.

Elnos Grupa je učestvovala na ovoj prestižnoj konferenciji, a jedan smo od ponosnih laureata dodijeljenih priznanja u oblasti elektroenergetike.

Konferencija je bila usmjerena na podršku unapređivanju energetske efikasnosti u Srbiji, sa ciljem brže realizacije projekata energetske efikasnosti i obnovljivih izvora energije direktnim povezivanjem potencijalnih poslovnih partnera. „Za povećanje energetske efikasnosti u lokalnim samoupravama u 2016. godini iz budžeta će biti izdvojeno 160 miliona dinara, dok je u prethodnoj godini za istu namjenu iz budžeta bilo izdvojeno 100 miliona dinara“, ovom prilikom izjavio je Pomoćnik ministra rudarstva i

energetike u Vladi Srbije Miloš Banjac. Dodao je i da će Srbija do 2020. godine morati da poveća učešće obnovljivih izvora energije na 27 odsto, kao i da do 2018. godine mora da smanji potrošnju finalne energije za devet odsto.

U okviru konferencije razgovaralo se i o ESCO projektima, javno-privatnom partnerstvu, uštedi energije, obnovljivim izvorima energije, pametnim brojilima, kogeneraciji, upravljanju otpadom, cirkularnoj ekonomiji.

Konferencija "BEES 2015" okupila je više od 400 učesnika, među kojima su bili predstavnici međunarodnih finansijskih institucija, donosioci odluka ESCO kompanija iz EU i regiona, domaće komercijalne banke, vodeće proizvođače EE i OIE opreme i materijala, domaće industrijske kompanije, kao i predsjednike više od 50 lokalnih samouprava iz Srbije.

**EN ELNOS GROUP
AWARDED ON 3RD BUSINESS
CONFERENCE BEES 2015**

Third all-day Business conference BEES 2015 "Development of energy efficiency market through new models of financing", was held on December 15, 2015 in Sava congress center in Belgrade.

Elnos Group took part in this prestigious conference and we are one of the proud laureates awarded in the field of electrical power system.

Conference aim was to support the improvement of energy efficiency in Serbia with the goal of faster realization of energy efficiency and renewable energy sources projects by directly connecting potential business partners. "In order to increase energy efficiency in local self-managements in 2016, RSD 160 million will be set aside, whereas in the last year RSD 100 million was set aside in the budget for the same purpose", Miloš Banjac, Assistant Minister of mining and energy of the Government of Serbia, said on this occasion. He also added that Serbia would have to increase its participation in renewable energy sources to 27 per cent by 2020. Serbia also has to decrease final energy consumption for 9 per cent by 2018.

In the frame of this conference, there were also discussions about ESCO projects, public private partnerships, energy saving, renewable energy sources, smart meters, co-generation, waste management, circular economics.

Conference "BEES 2015" gathered more than 400 participants, including representatives of international financial institutions, decision-makers from ESCO companies from the EU and the region, national commercial banks, leading manufacturers of EE and RES equipment and materials, national industrial companies, as well as the presidents of more than 50 municipalities from Serbia.



Predstavnice Elnos Grupe na konferenciji BEES 2015 / Representatives of Elnos Group at the conference BEES 2015

Elnos Grupa učesnik „Samita prestonica 2015“

Elnos Group participates in “Capital Summit 2015”

SR Elnos Grupa učestvovala je na „Samitu prestonica 2015“, koji je održan u Sava centru u Beogradu, a okupio je lidere iz 13 gradova centralne i jugoistočne Evrope. Samit je organizovao Grad Beograd u saradnji sa Nacionalnom alijansom za lokalni ekonomski razvoj (NALED), a Elnos Grupa je bila pokrovitelj ovog značajnog događaja.

Samit je zvanično otvorio premijer Srbije Aleksandar Vučić. Na Samitu je bilo riječi o razvoju velikih infrastrukturnih projekata i unapređivanju kvaliteta života u glavnim gradovima, a razgovori su bili podijeljeni u tri tematske cjeline: infrastruktura i urbani razvoj, inovativni modeli pružanja usluga za građane i privredu i kvalitet života, i budući razvoj gradova u jugoistočnoj i centralnoj Evropi.

Elnos Grupa je učestvovala u panel diskusiji o inovativnim modelima pružanja usluga za građane i privredu. Prezentacijom na temu „Pametni gradovi – energetska upravljanje i kontrola“, dotakli smo se izazova koje modernim distributivnim kompanijama donose megatrendovi, a u duhu razmjene dobrih iskustava iz prakse, predstavili smo i projekat Smart City Novi Sad. U realizaciji ovog projekta učestvovali smo 2012. i 2013. godine. Učesnicima Samita prezentovali smo benefite koje je u godinu i po dana korištenja ovaj projekat donio investitoru i krajnjem korisniku Elektrovojvodini i građanima Novog Sada.

UČESNICI

Samit je okupio oko 250 učesnika, među kojima su bili gradonačelnici Beograda, Atine, Beča, Budimpešte, Bukurešta, Ljubljane, Podgorice, Sarajeva, Skoplja, Sofije, Tirane, Varšave i Zagreba, zatim predstavnici Evropske unije, međunarodnih institucija, diplomatskog kora i privrede, kao i predstavnici javnih i privatnih preduzeća.

EN Elnos Group took part in “Capital Summit 2015”, which was held in the Sava Center in Belgrade and it gathered leaders of 13 cities of the Central and South-East Europe. Summit was organized by City of Belgrade cooperating with the National Alliance for Local Economic Development (NALED), and Elnos Group was sponsor of this important event.



Borko Torbica, domaćin na svečanom prijemu u Starom dvoru / Borko Torbica, host of the reception in Stari dvor

Summit was officially opened by Aleksandar Vučić, the Prime Minister of the Republic of Serbia. Summit participants discussed about development of large infrastructural projects and improvement of life quality in capitals. Discussions were divided in three theme sections: infrastructure and urban development, innovative models of provision of services for citizens, economy and life quality, as well as future development of cities in the South-East Europe and Central Europe.

Elnos Group took part in panel discussion on innovative models of provision of service for citizens and economy. Presentation titled “Smart cities” – electrical power management and control”, discussed challenges modern distributive companies brought by mega trends, and in the reference to exchange of good experiences in practice, we presented the

project titled Smart City Novi Sad. We participated in performance of this project in 2012 and 2013. Summit participants were presented benefits of this project for the Investor – Elektrovojvodina and Beneficiaries – inhabitants of Novi Sad - in the period of eighteen months.

PARTICIPANTS

Summit gathered about 250 participants. Among others, there were Mayors of Belgrade, Athens, Vienna, Budapest, Bucharest, Ljubljana, Podgorica, Sarajevo, Skopje, Sofia, Tirana, Warsaw and Zagreb, as well as representatives from the European Union, international institutions, diplomatic corps and economy, and representatives of public and private companies.

400 godina bogoslovije u manastiru Krka

400 years of seminary in Krka monastery

Ovo je veliki jubilej ne samo za Eparhiju dalmatinsku, nego i za cijelu Srpsku pravoslavnu crkvu, posebno za crkvenu prosvjetu

This is a great jubilee not only for Dalmatian Eparchy, but also for entire Serbian Orthodox Church and especially for church education



Manastir Krka / Krka monastery

SR Godine 2015, na praznik Preobraženja, održana je centralna svečanost povodom obilježavanja četiri vijeka bogoslovije „Sveta Tri Jerarha“ u manastiru Krka. Svetu arhijerejsku liturgiju služio je patrijarh srpski Irinej, sa mitropolitima i episkopima Srpske crkve.

„Krka je kroz vijekove simbol opstanka Srba u Dalmaciji“, istakao je patrijarh Irinej, rekavši da je sedmijekovna istorija manastira Krka svjedok i čuvar pravoslavlja u ovim stradalnim krajevima.

Bogoslovija „Sveta Tri Jerarha“ u manastiru Krka je najstarija srpska bogoslovija. Osnovao ju je 1615. godine mitropolit dabrobosanski Teodor, čije je sjedište u to vrijeme bilo u manastiru Rmnju. Bogata istorija manastira Krke je ujedno i istorija bogoslovije.

Njegovo preosveštenstvo episkop dalmatinski Fotije, istakao je da je ovo veliki jubilej ne samo za Eparhiju dalmatinsku, nego i za cijelu Srpsku pravoslavnu crkvu, posebno za crkvenu prosvjetu.

Episkop Fotije rekao je da su tri manastira svetinje – Krka, Dragović i Krupa, duhovni temelji i duhovne oaze pravoslavnog naroda na ovim prostorima kroz vijekove. Dodavši da: „Posebno bogoslovija, iz koje izlaze mladi ljudi, sveštenici koji će živjeti sa narodom

u Dalmaciji, ali i u drugim mjestima gdje Srpska pravoslavna crkva čuva i okuplja srpski narod. To je zajedništvo i jedinstvo koje predstavlja blagoslov za sve nas.“

Bogoslovija neprestano daje služitelje crkve, to je ono što je osnovno. Široko obrazovanje u bogosloviji manastira Krka steklo je 800 sveštenika i više od 15 episkopa.

„Imaju ljudi veliku ljubav prema Krki, dolaze iz raznih krajeva svijeta, ne samo pravoslavni, ljudi poštuju svetinje“, zaključuje episkop Fotije.

EN In 2015, on Transfiguration, central ceremony on the occasion of celebrating four centuries of the Seminary “Three Holy Hierarchs” was held in the Krka monastery. Holy liturgy was served by Serbian Patriarch Irinej of Serbia, with archbishops and bishops of the Serbian Church.

“Through centuries, Krka has been a symbol of Serbian’s survival in Dalmatia“, said Patriarch Irinej, and emphasized that seven centuries long history of the Krka monastery is witness and guardian of Orthodoxy in these victim regions.

Seminary “Three Holy Hierarchs” in the Krka monastery is the oldest seminary. It was established in

1615 by Archbishop of Dabar-Bosnia Teodor, whose seat at the time was in Rmanj monastery. Rich history of the Krka monastery is also the history of the seminary.

His grace Bishop of Dalmatia Fotije said: “This is a great jubilee not only for Dalmatian Eparchy, but also for entire Serbian Orthodox Church and especially for church education”.

Bishop Fotije said that three holy monasteries – Krka, Dragović and Krupa, are spiritual foundations and spiritual resorts of Orthodox people in this region throughout the centuries. He also added that: “In the first place, Seminary, which brings young people, priest who are to live with the people in Dalmatia, but also in other places where the Serbian Orthodox Church nurtures and gathers Serbian people, is very important. It is collectiveness and unity which is blessing for all of us.”

Seminary constantly provides priests, which is essential. Wide education in seminary of the Krka monastery provided 800 priests and more than 15 bishops.

“People’s love for Krka is big, they come from all over the world, not only Orthodox, people respect shrines“, concluded Bishop Fotije.

FUDBALSKA BAJKA ISLANDA

ICELANDIC FOOTBALL FAIRYTALE

SR Fudbalska reprezentacija Islanda bila je naj-prijatnije iznenađenje Evropskog prvenstva u Francuskoj 2016. Ova ostrvska država ostvarila je najbolji plasman do sada. Reprezentacija Islanda je među osam najboljih na Starom kontinentu, a u svojim redovima nema nijednog svjetski poznatog fudbalera. Islandani su oduševili mnoge širom Evrope, a sinergija između navijača i igrača pobrala je simpatije fudbalskog svijeta. Po povratku sa prvenstva novim nacionalnim herojima priređen je veličanstven doček u Reykjaviku, na kome je učestvovalo čak 30.000 Islandana, ili svaki deseti stanovnik.

Iako je nacionalni sport Islandana rukomet, Elnos Iceland pomogao je razvoju i afirmaciji fudbala u ovoj zemlji. Naime, Elnos Iceland ponosni je sponzor finala fudbalskog kupa Islanda u sezoni 2014/2015, koje je održano u Reykjaviku u julu 2015. godine.

Ovim je i najmlađa članica Elnos Grupe, na dalekom sjeveru Evrope, nastavila našu dugogodišnju tradiciju društveno odgovornog ponašanja.

EN Icelandic football national team was the most pleasant surprise of the European Championship in France. This island country has achieved the best result so far. Icelandic national team is one of the eight best teams of the Old Continent and there is no famous football player in their team. Icelanders delighted many people throughout the Europe and synergy of supporters and players got sympathies of the football world. After they returned from the Championship, the new national heroes got magnificent welcome in Reykjavik, which was attended by 30,000 Icelanders, i.e. every tenth inhabitant.

Although Icelandic national sport is handball, Elnos Iceland supported development and affir-

mation of football in this country. Namely, Elnos Iceland is a proud sponsor of finals of the Iceland Football Cup 2014/2015, held in Reykjavik in July 2015. The youngest member of the Elnos Group continued out long-term tradition of responsible social behavior at the far North of Europe by this act.



VISOKOGORCI OSVOJILI VRH LENJIN, VISOK 7.134 m

Visokogorci conquered Peak Lenin at 7.134 m

SR Dva člana ekspedicije Visokogoraca Crne Gore osvojila su pamijski vrh Lenjin, visok 7.134 m, u avgustu prošle godine. Ekspediciju je činilo pet istaknutih alpinista, koji su se za ovaj poduhvat naporno pripremali deset mjeseci. Visokogorci su ovu ekspediciju organizovali u cilju održavanja kontinuiteta postizanja visokih rezultata, a u nemogućnosti obezbjeđivanja sredstava za neki od 'seven summit' vrhova. Elnos Grupa je prepoznala njihove potrebe i nastojanja, te je jedan od sponzora odlaska Visokogoraca na Pamir.

Uspon na planinu Pamir bio je izuzetno težak i iscrpljujuć. Trajao je oko 18 dana. Alpinisti su prelazili pukotinu po pukotinu, traverzu po traverzu, sa teretom od oko 20 kg na leđima. U noći paklenog uspona osvojen je Lenjin vrh, nakon 11 sati hoda i savladavanja ogromnih poteškoća, vjetra koji je duvao brzinom od 80 km/h i temperature koja se spuštala na 31. podiok ispod nule.

Planinarski klub „Visokogorci Crne Gore“ u

Podgorici, osnovali su neki od najistaknutijih i najuspješnijih crnogorskih alpinista, postavivši nove standarde u crnogorskom planinarstvu. Klub je posvećen promociji planinarstva i zdravog života među djecom i omladinom. Pored učešća u planinarskim akcijama, klub razvija društvenu odgovornost i humanost svojih članova učešćem u akcijama spasavanja i drugim aktivnostima društvenog života.

EN Two members of expedition Visokogorci Crne Gore (eng. Highlanders of Montenegro) conquered Pamir Peak Lenin at height of 7,134 m in August last year. Expedition consisted of five renowned alpinists, which prepared themselves for ten months for this endeavor. Visokogorci organized this expedition in the aim of keeping continuity in achieving high results and unable to provide finances for some of 'seven summit' peaks. Elnos Group recognized their needs and efforts, so it was

one of the sponsors of Visokogorci's expedition to Pamir.

Climb to the mountain Pamir was extremely difficult and exhausting. It lasted about 18 days. Alpinists went over cracks and traverses, one after another, with burden of about 20 kg on their backs. In the night of hell climb, they conquered Peak Lenin after 11 hours of walking and overpassing extreme difficulties, wind that blew 80 km/h and temperature that went to 31° C below zero.

Mountaineering Club "Visokogorci Crne Gore" in Podgorica, was established by a number of the most significant and most successful Montenegrin alpinists and set new standards in Montenegrin alpinism. Club is devoted to promotion of mountaineering and healthy life among children and youth. Apart from participating in mountaineering activities, club develops social responsibility and humanity of its members by taking part in rescue activities and other activities of social life.



OBUKE

T R A I N I N G S

SR ELNOS GRUPA NA TRADICIONALNOJ OBUCI ABB-A U ŠVEDSKOJ

Važnost stručnog usavršavanja dokazujemo konstantnim edukacijama Elnos tima. U periodu od 18. do 29. aprila ove godine, dva inženjera Elnos Grupe prisustvovala su obuci „Integration partner training“, koja je održana u ABB-ovom trening centru u Vesterosu.

Ovo je veoma cijenjena tradicionalna obuka, posebno osmišljena za kompanije koje blisko sarađuju sa ABB-om. Ovog proljeća, vrijedna znanja sa obuke ponijeli su predstavnici iz četiri kompanije. Kandidati su osposobljeni za rad sa ABB-ovim proizvodima iz oblasti automatizacije transformatorskih stanica sa IEC 61850 horizontalnom komunikacijom, uključujući i HSI (Human System Interface) na staničnom nivou. Obukom su obuhvaćene četiri cjeline:

-PCM 600-softverski paket koji omogućava inženjering zaštitno-upravljačkih uređaja;

-IEC 61850-aktuelni protokol koji se koristi u automatizaciji transformatorskih stanica.

Dva softverska paketa IET600 i ITT600 koji omogućavaju inženjering i provjeru rada horizontalne i vertikalne komunikacije na nivou transformatorske stanice;

-REC670-upravljačko-zaštitni uređaj iz ABB-ove serije 670, koji je trenutno jedan od najmoćnijih i najkompleksnijih uređaja na tržištu za upravljanje u transformatorskim stanicama na nivou polja;

-Integration – uvezivanje zasebnih jedinica i kompletan sistem (HSI), tj. upravljanje na staničnom nivou uz pomoć MicroSCADA sistema.

Jedan od dva najveća ABB-ova centra u Švedskoj je upravo ABB u Vesterosu, koji zapošljava 4.200

radnika. Vesteros se nalazi u centralnom dijelu Švedske, na obalama jezera Malaren. Kao jedan od najstarijih gradova u Švedskoj, veoma je primamljiva turistička destinacija.

EN ELNOS GROUP ATTENDS TRADITIONAL ABB TRAINING IN SWEDEN

Importance of professional improvement is proven by constant trainings of Elnos team. In the period from April 18 to 29 this year, two Elnos Group engineers attended training “Integration partner training” held at the ABB’s training center in Vesteros.

This is a much respected traditional training especially designed for companies closely working with ABB. This spring, representatives of four companies got valuable knowledge from the training. Candidates got skills in working with ABB’s products in the field of automation transformer units with IEC 61850 horizontal communications and including HSI (Human System Interface) at the base level. Training covered four fields:

-PCM 600-software package enabling engineering of protective-controlling devices;

-IEC 61850-current protocol used in automation of transformer units.

Two software packages IET600 and ITT600 enabling engineering and check of horizontal and vertical communications work at the level of transformer unit;

-REC670-controlling-protective device from ABB’s series 670, which, currently, is one of the most powerful and most complex devices in the market designed for control in transformer units at the field level;

-Integration – connection of separate units and entire system (HSI), e.i. control on base level supported by MicroSCADA system.

One of two biggest ABB’s centers in Sweden is just this one in Vesteros, which employs 4,200 employ-



Učesnici obuke “Integration partner training” / Participant of the training “Integration partner training”

ees. Vesteros is in the central part of Sweden at the bank of Lake Malaren. Being one of the oldest towns in Sweden, it is a very attractive touristic destination.

SR USAVRŠAVANJE ZA RAD SA VN PREKIDAČIMA

Tri radnika Elnos Grupe provela su deset dana na obuci za visokonaponske prekidače ABB-a, tipa LTB 72,5-800 kV sa radnim mehanizmima BLK222, FSA1, MSD1, BLG1002A.

Obuka je održana u novom i odlično opremljenom prostoru za obuke i treninge, specijalizovane za visokonaponske prekidače, u gradu Ludvika u Švedskoj. Ovom, veoma sadržajnom obukom obuhvaćene su teorijska i praktična obuka za navedene VN prekidače.

Teorijskim dijelom obuke obuhvaćen je detaljan opis tipa prekidača i mehanizma, kao i mnogi grafički prikazi načina njihovog funkcionisanja, pojedinačno za svaki tip prekidača i mehanizma. Najzanimljiviji dio obuke je upravo praktični dio, gdje su se naše kolege, uz stručnu pomoć iskusnog trenera, detaljno upoznale sa svim dijelovima prekidača i svakim mehanizmom pojedinačno. Posebna pažnja bila je usmjerena na bitne detalje prilikom montaže i demontaže pojedinih dijelova, zatim na dijelove koje treba pravilno i pravovremeno servisirati i održavati na adekvatan način.

Veoma je značajno naglasiti da nismo dugo čekali da naučeno primijenimo u svakodnevnom radu. Već u junu smo imali priliku montirati 110 kV prekidače u TS Bileća, kao i 400 kV prekidače u TS Ribarevine u Crnoj Gori. Ovo je samo početak, jer su pred nama dogovoreni poslovi za montažu značajnog broja prekidača u novim i u 110 kV trafostanicama koje su u rekonstrukciji.

Inače, Ludvika je prijatno mjesto u srcu Švedske. Mjesto na kome se održavala obuka je ujedno i mjesto gdje se nalazi fabrika ABB-a, u kojoj se proizvodi VN oprema, između ostalog i visokonaponski prekidači raznih naponskih nivoa.

EN IMPROVEMENT FOR WORK WITH HV BREAKERS

Three employees of the Elnos Group spent ten days on ABB training for high-voltage breakers, type LTB 72.5-800 kV with operating mechanisms BLK222, FSA1, MSD1, BLG1002A.

Training was held in new and excellently equipped educating and training area, specialized for high-voltage breakers in Ludvika, Sweden. This very comprehensive training covered theoretical and practical parts of training for the mentioned HV breakers.

Theoretical part of training covers detailed description of the breakers type and mechanisms, as well as many graphic presentations of their modus operandi, separately for each breaker type and



U novom trening centru ABB-a / At the new ABB training center

mechanism. The most important part of training is practical one, where our colleagues with help of professional experienced trainers got to know all breaker parts and each mechanism individually in detail. They paid special attention to important details in assembly and disassembly of individual parts, as well as to parts to be maintained properly and timely.

It is very important to mention we did not wait for long time to apply the acquired knowledge in everyday work. In June already, we got a chance to install 110 kV breakers in SS Bileća, as well as 400 kV breakers in SS Ribarevine in Montenegro. This only is a start, since we have already contracted projects for installation of significant number of breakers in new and in 110 kV substations being upgraded.

Namely, Ludvika is a pleasant town in heart of Sweden. Place where training was held also is a location of ABB factory, where HV equipment is produced - high-voltage breakers of different voltage levels among other items.

SR FAT U INDIJI, ISKUSTVO KOJE SE NE ZABORAVLJA

„Indija je zaista jedinstvena zemlja, te je prethodna posjeta bila iskustvo koje se ne zaboravlja. Ova zemlja prepuna je misterija i zanimljivosti koje nikoga ne ostavljaju ravnodušnim.“ Ovako je svoja iskustva sa putovanja na prijem opreme u Indiji opisao Marko Mijić, rukovodilac divizije za elektrane i OIE u Elnos Grupi. Zatim je dodao: „U Indiji smo bili u periodu od 19. do 25. oktobra 2015. godine. Razlog za ovo daleko putovanje jeste trodnevno ispitivanje i prijem opreme u fabrici kompanije Andritz u industrijskoj zoni Mandideep, udaljenoj 23 km od grada Bopal, u kome smo bili smješteni.“

FAT (Factory Acceptance Tests) raden je za opremu koju je Andritz proizveo za malu hidroelektranu Bočac 2. Ispitivanja i kontrolu kvaliteta statora generatora turbinskih agregata izvršili su članovi konzorcijuma isporučioaca opreme, u kome je Andritz član, a Elnos Grupa vodeći član. Prijem predmetne opreme, pored predstavnika naše kompanije, obavili su predstavnici investitora, Hidroelektrana na Vrbasu i nadzornog organa, Instituta za vodoprivredu „Jaroslav Černi“ iz Beograda.

„U slobodno vrijeme, naši odlični domaćini iz partnerske kompanije Andritz Hydro izašli su nam u susret i pružili podršku za obilazak nekoliko najatraktivnijih turističkih destinacija u ovoj prelijepoj zemlji. Posjetili smo Tadž Mahal, Crvenu tvrđavu, Humadžunovu grobnicu i Lotosov hram, od kojih su prve tri znamenitosti na listi spomenika Svjetske kulturne baštine UNESCO“, kaže Mijić.

Tadž Mahal je dragulj islamske umjetnosti i jedno od univerzalnih remek djela svjetskog nasljeđa. Ovaj veličanstveni mauzolej od bijelog mermera, simbol besmrtnosti ljubavi, izgrađen je u 17. vijeku u gradu Agra. Gradio ga je šah Džahan svojoj voljenoj ženi Muntaz Mahal. Smatra se vrhunskim ostvarenjem mogulske arhitekture, zbog stila koji kombinuje elemente persijskih, indijskih i islamskih arhitektonskih stilova.

Impozantnu i savršeno očuvanu Crvenu tvrđavu u Delhiju čini kompleks tvrđava mogulskog vladara šaha Džahana. Crvena tvrđava predstavlja vrhunac mogulske kreativnosti koja je, pod šaha Džahanom, dovedena na novi nivo prefinjenosti i stila koji je snažno uticao na razvoj arhitekture u Indiji. Tvrđava je služila kao kraljevska rezidencija mogulskih vladara sve do 1857. godine.

Humadžunova grobnica u Delhiju, izgrađena 1570. godine, od posebnog je kulturnog značaja, kao prva vrtna grobnica na indijskom potkontinentu. Kao prvi veliki dinastijski mauzolej, nadahnuo je nekoliko velikih arhitektonskih inovacija, što je kulminiralo izgradnjom Tadž Mahala. Grobnicu je naručila Humadžunova supruga, a izgrađena je pod pokroviteljstvom njegovog sina, velikog cara Akbara.

Lotos hram u Nju Delhiju, poznat i pod nazivom Bahai hram, remek-djelo je moderne arhitekture, koje objedinjuje indijsku istoriju i kulturu i moderno inženjerstvo i arhitekturu. Ovaj hram je jedan od simbola Nju Delhija i jedna od najposjećenijih znamenitosti u Indiji. Dizajn hrama je inspirisan cvijetom lotosa koji predstavlja simbol mira, čistoće, ljubavi i besmrtnosti i nacionalni je cvijet Indije. Projektovao ga je i dizajnirao iranski arhitekta Fariborz Sahba iz Kanade. Završen je 1986. godine.

EN FAT IN INDIA, EXPERIENCE TO REMEMBER

"India really is a unique country, so the previous visit was experience to remember. This country is full of mysteries and interesting things and no one can be indifferent." This is how Marko Mijić, Manager of the Sector for electrical power plants and RES in the Elnos Group, describes his experience in India from the trip for equipment acceptance. Then he adds: "We were from October 19 to October 25, 2015 in

India. The reason for this distant travel was three-day test and acceptance of equipment in the factory of Andritz company in industrial area Mandideep, 23 km away from the city of Bopal, where we were accommodated."

FAT (Factory Acceptance Tests) was performed for equipment that Andritz had produced for a Mini hydro power plant Bočac 2. Tests and quality control of stator for generator for turbine generators were performed by members of consortium of the equipment Purchaser, where Andritz is a member, and Elnos Group is Leader. Acceptance of the subject equipment, apart from representatives of our company, was also performed by representatives of the Investor, Hidroelektrana na Vrbasu (Hydro power plant on Vrbas) and Engineer, Institute for development and water resources "Jaroslav Černi" from Belgrade.

"In free time, our excellent hosts of partner company Andritz Hydro were forthcoming and provided us with sightseeing of several most attractive tourist destinations in this beautiful country. We visited Taj Mahal, Red Fort, Humayun Tomb and Lotus Temple. First three out of these four sights are on the list of UNESCO World Heritage Site", says Mijić.

Taj Mahal is the jewel of Islamic art and one of the unique masterpieces of world heritage. This magnificent mausoleum made of white marble stone, symbol of immortal love, was built in 17th century

in Agra. It was built by Shah Jahan to his beloved wife Muntaz Mahal. It is believed to be master accomplishment of Mogul architecture due to the style combining elements of Persian, Indian and Islamic architectural styles.

Impressive and perfectly preserved Red Fort in Delhi consists of fortress complex of Mogul ruler Shah Jahan. Red Fort represents the top of Mogul creativity, which, during Shah Jahan, was on the new level of delicacy and style that greatly affected architectural development in India. Fortress served as king residency for Mogul rulers up to 1857.

Humayun Tomb in Delhi, built in 1570, is of special cultural significance, being the first garden tomb of the Indian subcontinent. Being the first big dynasty mausoleum, it inspired several architectural innovations, which climaxed in construction of Taj Mahal. Tomb was ordered by Humayun's wife, and it was built under protection of their son, great Tsar Akbar.

Lotus Temple in New Delhi, also known as Bahai Temple, is a masterpiece of modern architecture, which comprises Indian history and culture and modern engineering and architecture. This temple is one of the symbols of New Delhi and one of the most visited sights in India. Temple designed was inspired by lotus flower, which represents symbol of peace, purity, love and immortality and is a national Indian flower. It was designed by Iranian architect Fariborz Sahba from Canada. It was completed in 1986.



Učesnici FAT-a prilikom obilaska Tadž Mahala / FAT participants during Taj Mahal tour

Uniplom III

Plastična kodirano-sigurnosna plomba

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