**Project**
Reconstruction of substation 110/35/10 kV Pazarić and reconstruction of the transmission line 2x110 kV for SS Pazarić

**Status**
Finished

**Country**
Bosnia and Herzegovina

**Period**
March, 2017 – August 2018.

**End Client**
Elektroprenos-Elektroprijenos BiH

**Equipment installed:**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Končar-Switchgear Inc. (Končar Aparati i postrojenja d.d.)</th>
</tr>
</thead>
</table>

**Končar-Switchgear Inc (Končar Aparati i postrojenja d.d.), as the regional leader in production of Switchgear for HV Electric power transmission substations, follows 90 years old tradition in production of Switchgear products in Zagreb, capital of Croatia.**

**General Engineering d.o.o. as the Končar Switchgear partner, had successfully installed High voltage SF6 circuit breakers 123 kV and Disconnectors & earthing switches 123 kV:**

- Three phase three-pole outdoor SF6 circuit breakers, 123 kV,
- Three phase single-pole outdoor SF6 circuit breakers, 123 kV,
- Three-pole two column central break rotary disconnectors, 123 kV; outdoor; with poles in parallel,
- Three-pole two column central break rotary disconnectors, 123 kV; outdoor; with poles in parallel; with earthing switch,
- SF6 gas with equipment to refill.

GenE. technical experts and engineers working on this project have designed, provided and delivered equipment to the installation site, supervised the installation and completed full commissioning.

*Figure 1: Three-pole two column central break rotary disconnectors, 123 kV; with poles in parallel*

*Figure 2: Three-pole two column central break rotary disconnectors, 123 kV; with poles in parallel(left) and Three phase single-pole outdoor SF6 circuit breakers, 123 kV(right)
Končar Switchgear installed was tested, supervised, pre-commissioned and commissioned, with a guarantee, the associated equipment and executed works and services. Switchgear had also been manufactured and factory tested by manufacturer.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>ABB Switchgear - Medium Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The company ABB is a pioneering technology leader that works closely with utility, industry, transport and infrastructure customers in roughly 100 countries. With more than four decades at the forefront of digital technologies, they are leaders in digitally connected and enabled industrial equipment and systems with an installed base of more than 70,000 control systems connecting 70 million devices. GenE. technical experts and engineers have designed, supervised the installation and fully tested, commissioned and energized the switchgear on site, Medium Voltage Switchgear had been manufactured and factory tested by manufacturer.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Manufacturer</th>
<th>GE Grid Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>GE’s Grid Solutions business serves customers globally with over 17,000 employees in approximately 80 countries. Grid Solutions helps enable utilities and industry to effectively manage electricity from the point of generation to the point of consumption, helping to maximize the reliability, efficiency and resiliency of the grid. Following list of GE Grid equipment was</td>
</tr>
</tbody>
</table>

Figure 3: Three single-pole outdoor SF6 circuit breakers, 123 kV

Figure 4: 36 kV Medium Voltage Switchgear (left) ABB Turkey, 24 kV Medium Voltage Switchgear (left) ABB Czech Republic (right)

Figure 5: 24 kV Medium Voltage Switchgear ABB Czech Republic

Figure 6: Three-pole two column central break rotary disconnectors,
Reconstruction of SS 110/35/10 kV Pazarić and reconstruction of the transmission line 2x110 kV for SS Pazarić

Provided and installed in the substation:

- Three-pole two column central break rotary disconnectors, 52 kV; outdoor; with poles in parallel
- Single-pole two column central break rotary disconnectors, 52 kV; outdoor

All equipment have been delivered to the installation site and installed.

GenE. technical experts and engineers have designed, supervised the installation and fully tested, commissioned and energized the switchgear on site.

Manufacturer

Končar Instrument transformers Inc., Croatia

Končar-Instrument transformers Inc., well known European producer whose production scope includes:
- High voltage oil insulated instrument transformers (current, inductive voltage, capacitive, combined), high voltage SF6 insulated instrument transformers (current, voltage, combined), medium voltage instrument transformers (epoxy resin or oil insulated), instrument transformers for special use, other products (LV instrument transformers, HV instrument transformers for GIS).

Following list of Končar-IT equipment was provided and installed in the substation:

- 123 kV current instrument transformers 2x300/1/1/1/1
- 123 kV current instrument transformers 2x150/1/1/1/1
- 123 kV inductive voltage instrument transformers

All equipment have been delivered to the installation site and installed. Instrument transformers were tested, fully commissioned.
### Tyco Raychem

**Description**

Following list of Tyco Raychem equipment was provided and installed in the substation:
- Metal-oxide surge arresters for outdoor installation, 123 kV
- Metal-oxide surge arresters for outdoor installation, 12 kV

All equipment have been delivered to the installation site and installed. Surge arresters were tested, and all required documentation was provided.

![Figure 10: Metal-oxide surge arresters for outdoor installation, 123 kV](image)

### Elektroporcelan AD - Novi Sad, Serbia

**Description**

Following list of Elektroporcelan AD equipment was provided and installed in the substation:
- 123 kV post insulators for outdoor installation
- 36 kV post insulators for outdoor installation

All equipment have been delivered to the installation site and installed. Post insulators were tested, and all required documentation was provided.

![Figure 11: 123 kV post insulators for outdoor installation](image)
<table>
<thead>
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</table>
| Energoinvest SUE(Benning), BiH | The following equipment have been provided:  
- 3x380/220 V 50 Hz auxiliary power supply cabinets completely equipped and tested  
- 220V DC auxiliary power supply cabinets - fully equipped and tested  
All equipment have been delivered to the installation site. It will be installed, tested, and all required documentation will be provided. |

**Figure 12:** 3x380/220 V 50 Hz auxiliary power supply cabinets completely equipped and tested(left) 220V DC auxiliary power supply cabinets - fully equipped and tested(right)  
**Figure 13:** Battery Cabinets

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| Secondary systems based on Schneider Electric, ABB, Končar ProzaNet, Eberle and others | **Schneider Electric is leading the Digital Transformation of Energy Management and Automation in Homes, Buildings, Data Centers, Infrastructure and Industries.**  
With global presence in over 100 countries, Schneider is the undisputable leader in Power Management – Medium Voltage, Low Voltage and Secure Power, and in Automation Systems. They provide integrated efficiency solutions, combining energy, |

**Figure 14:** Command room
**Automation and software.**

*General Engineering* d.o.o., as the Schneider partner, had successfully implemented new *IEC 61850 iSAS system based on Schneider Electric Control & Protection IEDs and Končar ProzaNet SCADA system.*

New iSAS system installed in SS 110/x kV Pazarić, is based on IEC61850 protocol with the use of Schneider Electric family of relays for HV protection panels along with ABB REF 630 for Medium Voltage Switchgear, Končar SCADA ProzaNet software.

Following list of Schneider Electric equipment was installed in the substation:

- MICOM C434 – Bay Control Unit
- MICOM P437 – Distance Protection
- MICOM P645 – Transformer Differential Protection
- MICOM P139 – MV Switchgear control & protection
- MICOM P116 – Numerical overcurrent protection

Following ABB equipment was installed in the substation:

- REF 630 – comprehensive feeder management IED for protection, control, measuring and supervision of utility and industrial distribution substations.

Following Eberle equipment was installed in the substation:

- REG-DA – Voltage Regulator

All equipment have been delivered to the installation site, installed, commissioned and energized.
Control & Protection relays:
- Schneider Electric: C434, C437, P645, P139, P116, REF 630, REG-DA

SCADA equipment:
- SCADA Proza Net

Communication protocols used:
- IEC 61850
- IEC 60870-5-101
- IEC 60870-5-104

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**Figure 18.** Control & Protection panels Schneider Electric

**Figure 19.** SCADA PROZA NET KONČAR

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**Figure 20.** Outdoor Switchyard 123 kV(before)

**Figure 21.** Outdoor Switchyard 123 kV(after)

**Figure 21.** Outdoor Switchyard 123 kV OHl(before)

**Figure 22.** Outdoor Switchyard 123 kV OHl(after)
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Figure 23.: Outdoor Switchyard 123 kV Transformer Bay (before)

Figure 24.: Outdoor Switchyard 123 kV Transformer Bay (after)

Figure 25.: SS side view (before)

Figure 25.: SS side view (after)

Figure 26.: Outdoor Switchyard 123 kV Transformer Bay (before)

Figure 27.: Outdoor Switchyard 123 kV Transformer Bay (after)

Figure 28.: SS top view (before)

Figure 29.: SS top view (after)

Figure 30.: Medium Voltage Switchgear (before)

Figure 31.: Medium Voltage Switchgear (after)
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Figure 32.: Control room (before)

Figure 33.: Control room (after)

Contact information

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