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Smartgrid project SINCRO.GRID

Workshop on smart electricity grid projects
Vienna, October 09, 2023

Mate Lasić
HOPS

ELES | HOPS | SODO | HEP OPERATOR DISTRIBUCIJSKOG SUSTAVA

10.3-0022-SIHR-W-M-16-Implementation of the SINCRO.GRID PCI
First completed Project of Common Interest in the Priority Thematic Area Smart Grids Deployment

SINCRO.GRID – basic challenges and needs

- ✓ Solved issue of voltage profiles
- ✓ Improved system balancing performance
- ✓ Better utilization of grid
- ✓ Higher potential penetration of RES
- ✓ Better observability of MV&HV grids
- ✓ Coordinated investment actions with more impact on regional issues

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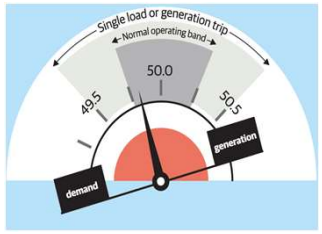
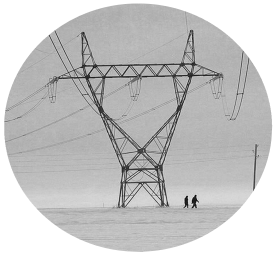
Co-financed by the Connecting Europe Facility of the European Union

An overview of SINCRO.GRID projects

Flexibility of Reactive power



Flexibility of Active power



Increasing transmission lines capacities

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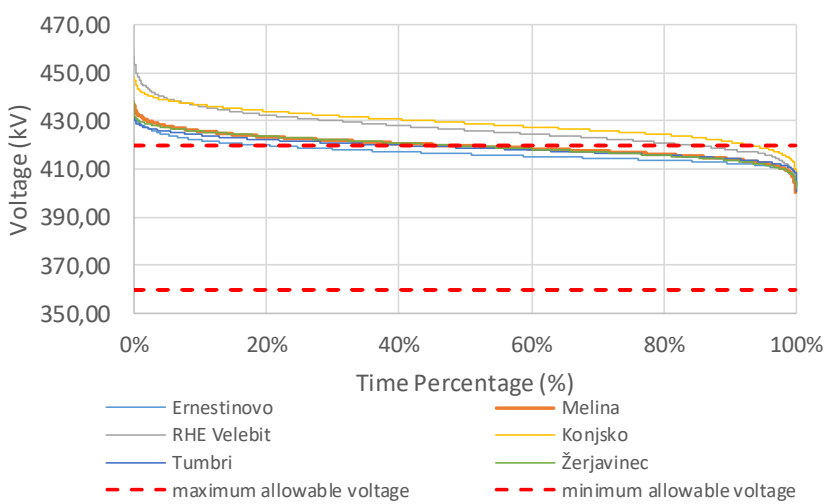
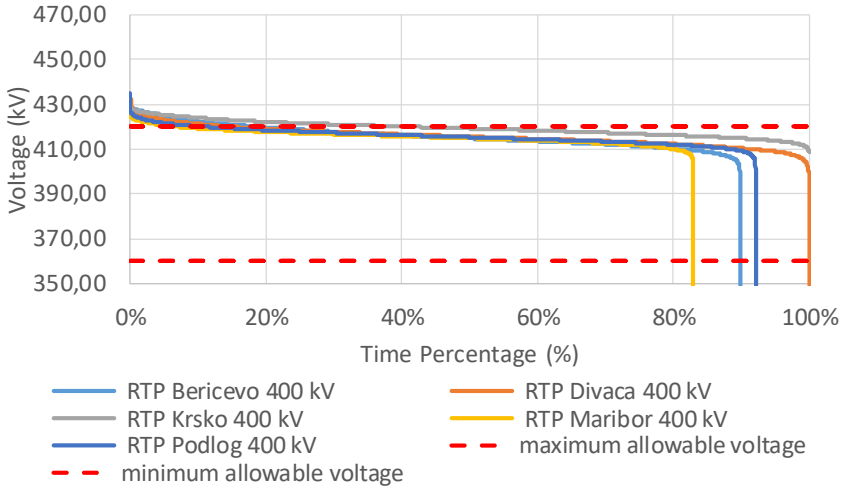
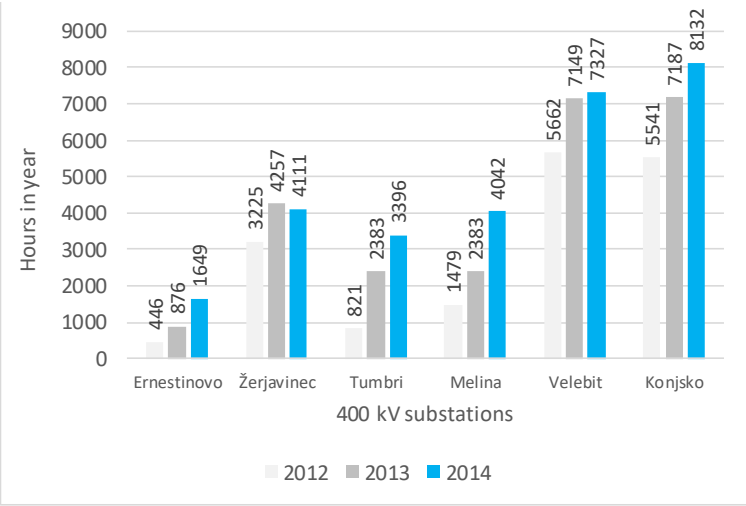
Functionality monitoring for the all systems

Voltage levels in Croatia/Slovenia

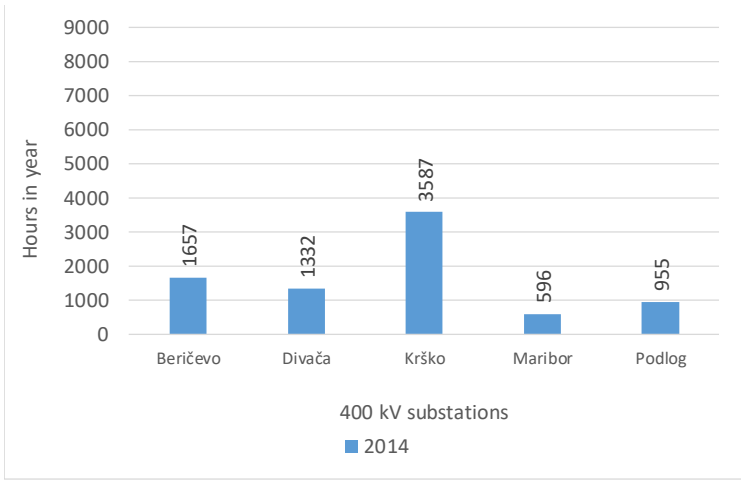
Arranged diagrams of voltage levels for 400kV nodes in Croatia and Slovenia







Hours above 420 kV



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Compensation devices

- ✓ Installation of Compensation devices to maintain acceptable voltages and optimize system losses achieved the goal of voltage profile control and the possibility of voltage regulation.
- ✓ As a result, these compensation devices have contributed to improved network stability.
- ✓ Their operation's effects also positively impact the transmission systems of neighboring countries.

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Compensation devices

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Variable shunt reactor

- 150 Mvar / 400kV SS Divača

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Compensation devices

Mechanically switched capacitor with damping network

+ 100 Mvar / 400 kV SS Divača

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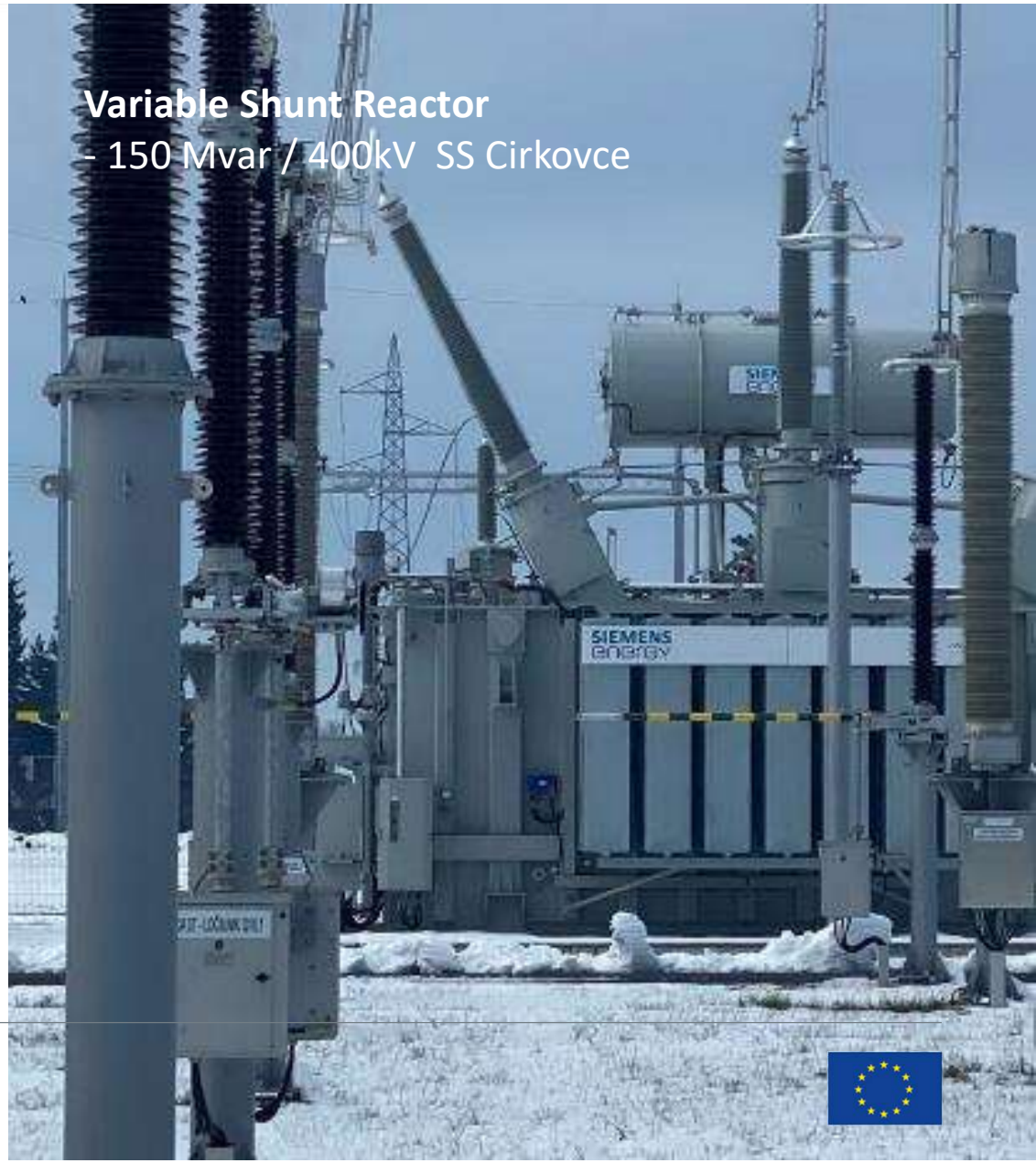
Compensation devices



Variable Shunt Reactor

- 150 Mvar / 400kV SS Cirkovce

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Compensation devices

Static synchronous compensator
+/- 150 Mvar / 400 kV SS Beričevo

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Compensation devices

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Variable shunt reactor

- 200 Mvar /220kV SS Melina

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Compensation devices

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Variable shunt reactor
- 100 Mvar / 220 kV SS Mraclin

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Compensation devices

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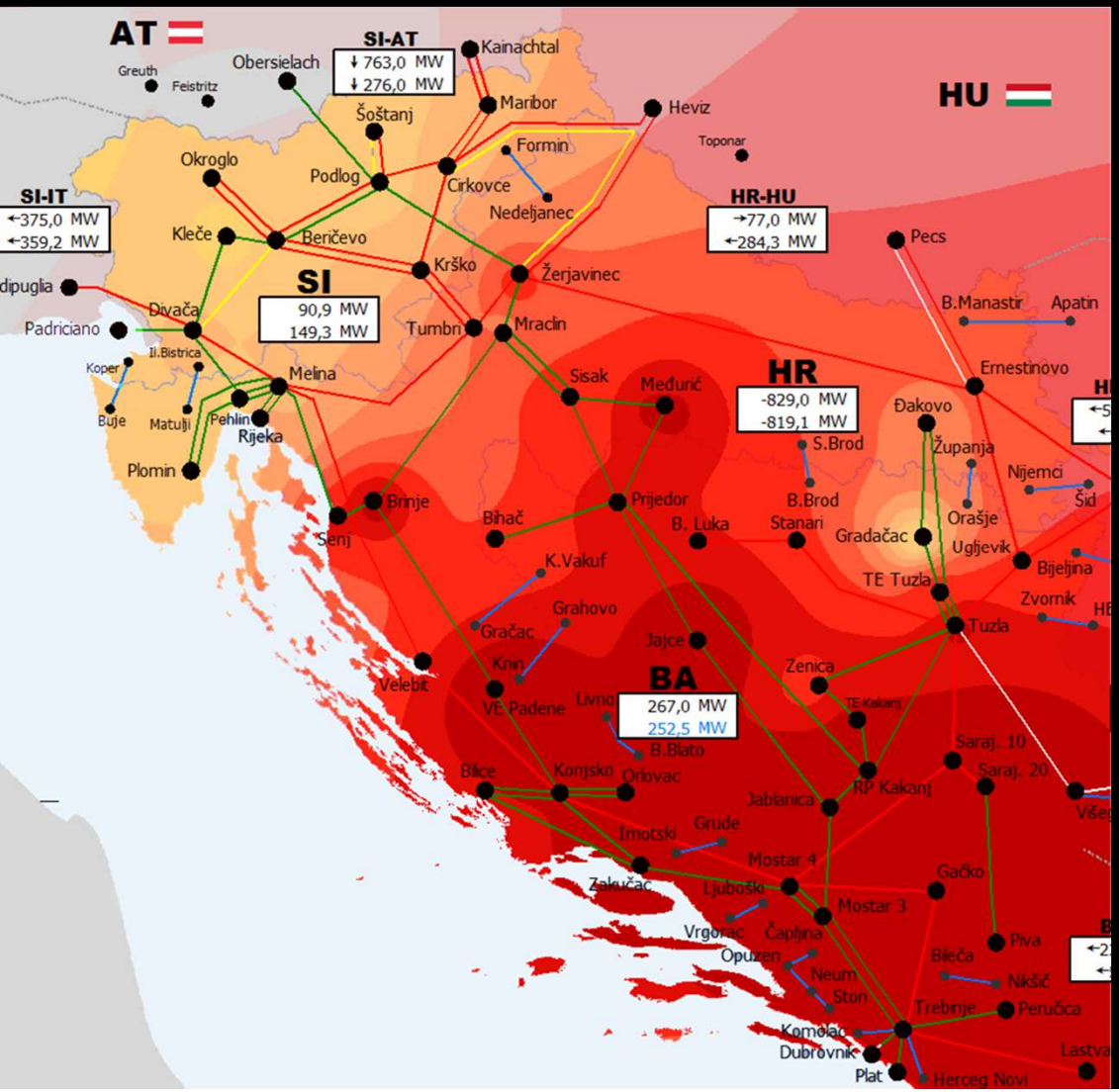
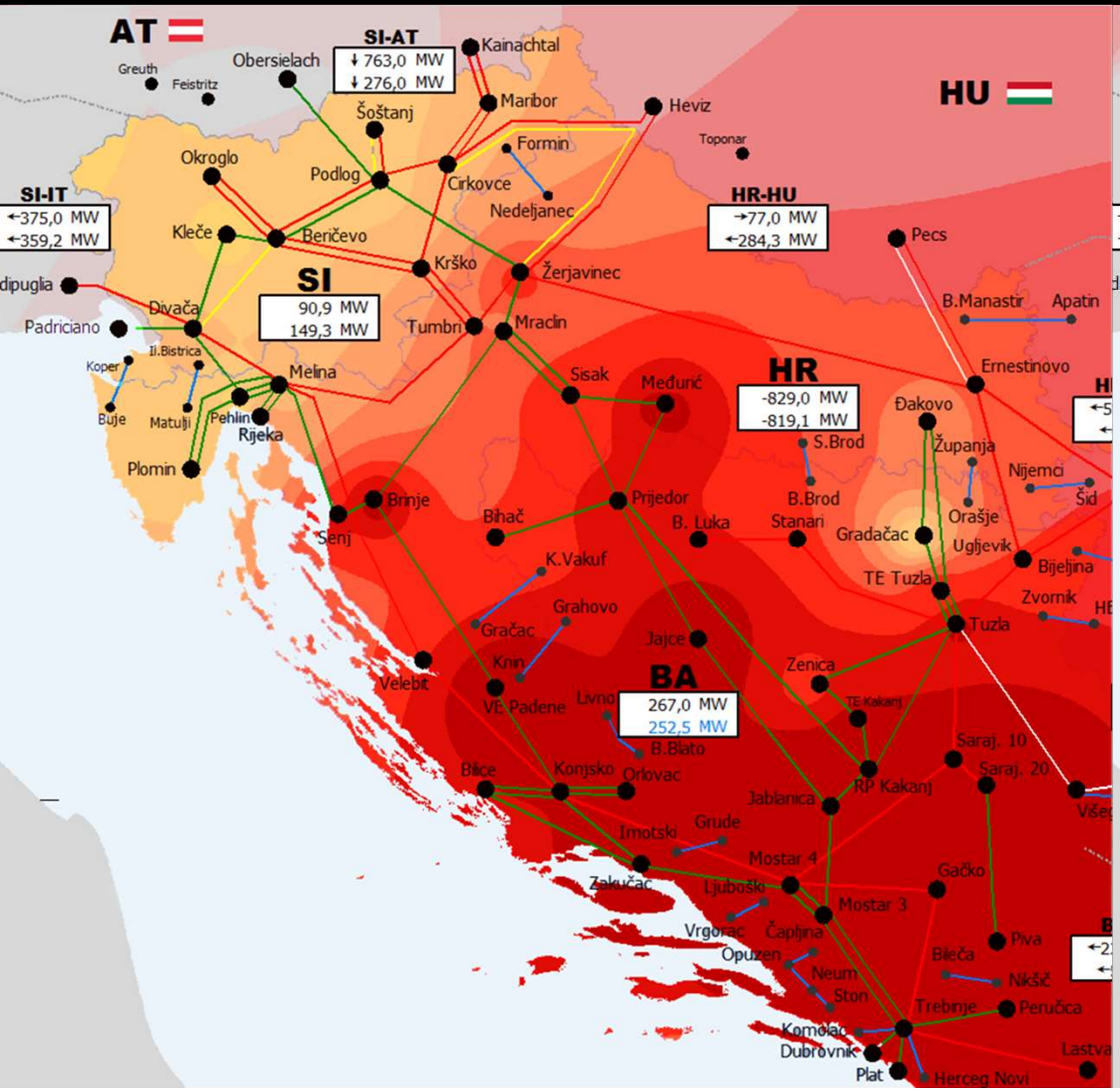
Static synchronous compensator
+40/-250 Mvar /220 kV SS Konjsko

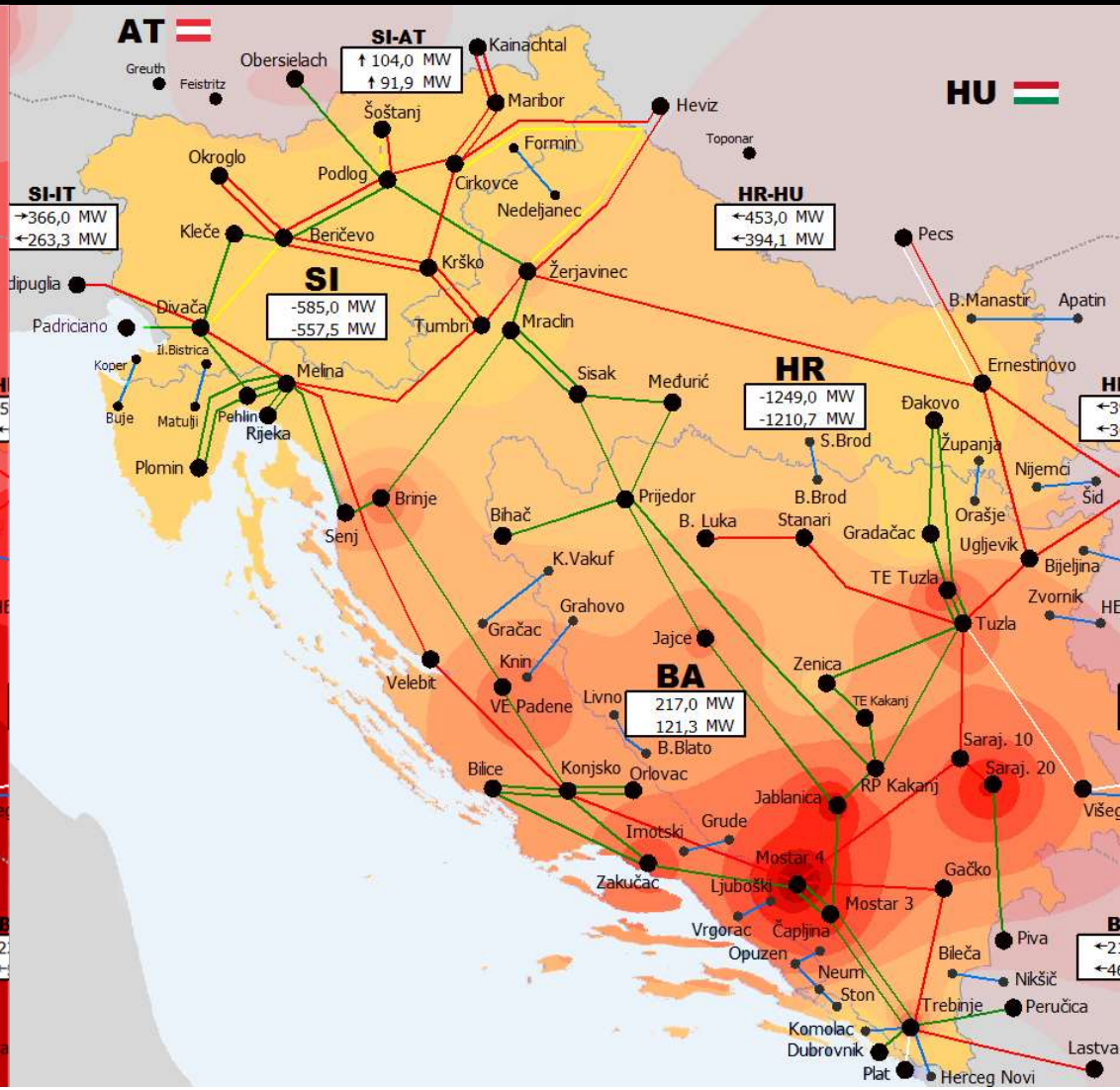
Before


AT
SI-AT
763,0 MW
276,0 MW
Kainachtal
Obersielach
Greuth
Feistritz
Maribor
Heviz
HU
Šoštanj
Toponar
Formin
Okroglo
Podlog
Cirkovce
Nedeljanec
SI-IT
375,0 MW
359,2 MW
HR-HU
77,0 MW
284,3 MW
Pecs
Kleče
Beričevo
Krško
Žerjavinec
SI
90,9 MW
149,3 MW
B.Manastir
Apatin
Divača
Tumbri
Mracin
Padriciano
Ernestinovo
Koper
Il.Bistrica
Sisak
Međurić
HR
-829,0 MW
-819,1 MW
Melina
Đakovo
Buje
Matulji
Pehlin
Rijeka
S.Brod
Županja
Nijemci
Plomin
Brinje
Prijedor
B.Brod
Šid
Bihač
B. Luka
Stanari
Orašje
Senj
Gradačac
Ugljevik
K.Vakuf
Bijeljina
TE Tuzla
Grahovo
Zvornik
Gračac
Tuzla
Jajce
Knin
Zenica
Velebit
BA
267,0 MW
252,5 MW
VE Padene
Livno
TE Kakanj
B.Blato
Saraj. 10
Bilice
Konjsko
Orlovac
Saraj. 20
RP Kakanj
Jablanica
Imotski
Grude
Mostar 4
Gačko
Zakučac
Ljuboški
Mostar 3
Vrgorac
Čapljina
Piva
Opuzen
Bileča
Neum
Nikšić
Ston
Trebinje
Peručica
Komolac
Dubrovnik
Lastva
Plat
Herceg Novi

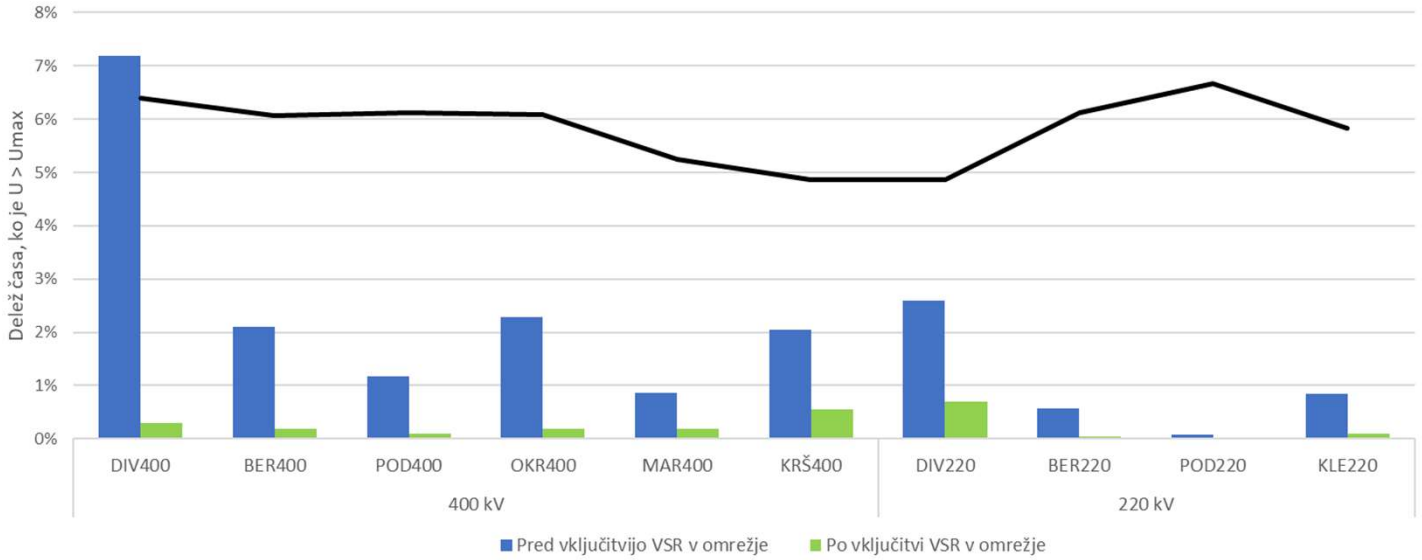
Before



After



Voltage conditions in the period before and after the switching on VSR



The figure shows the time when the voltage exceeded the recommended values during the observed periods. According to the observed transformer stations, the proportion of time of increased voltages after switching on the VSR in the system decreased below 1 percent (before was 7%).

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Battery energy storage systems

- ✓ BESS contributes to the green transformation of electricity systems and provides a powerful tool for addressing modern challenges in the electricity system.
- ✓ There is also obtained the instrument for safety mechanism regarding frequency control.

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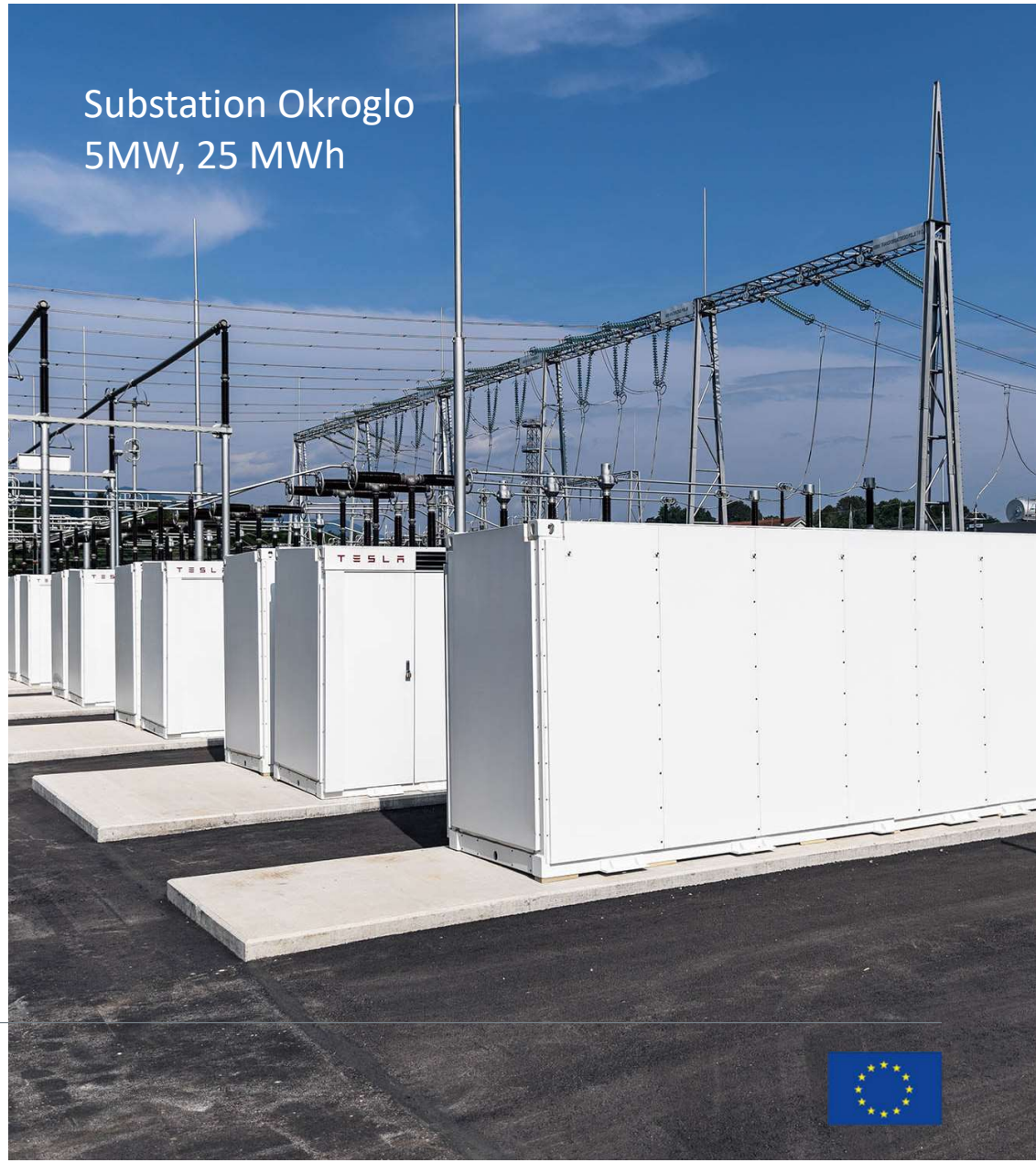
Battery energy storage systems



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Battery energy storage systems

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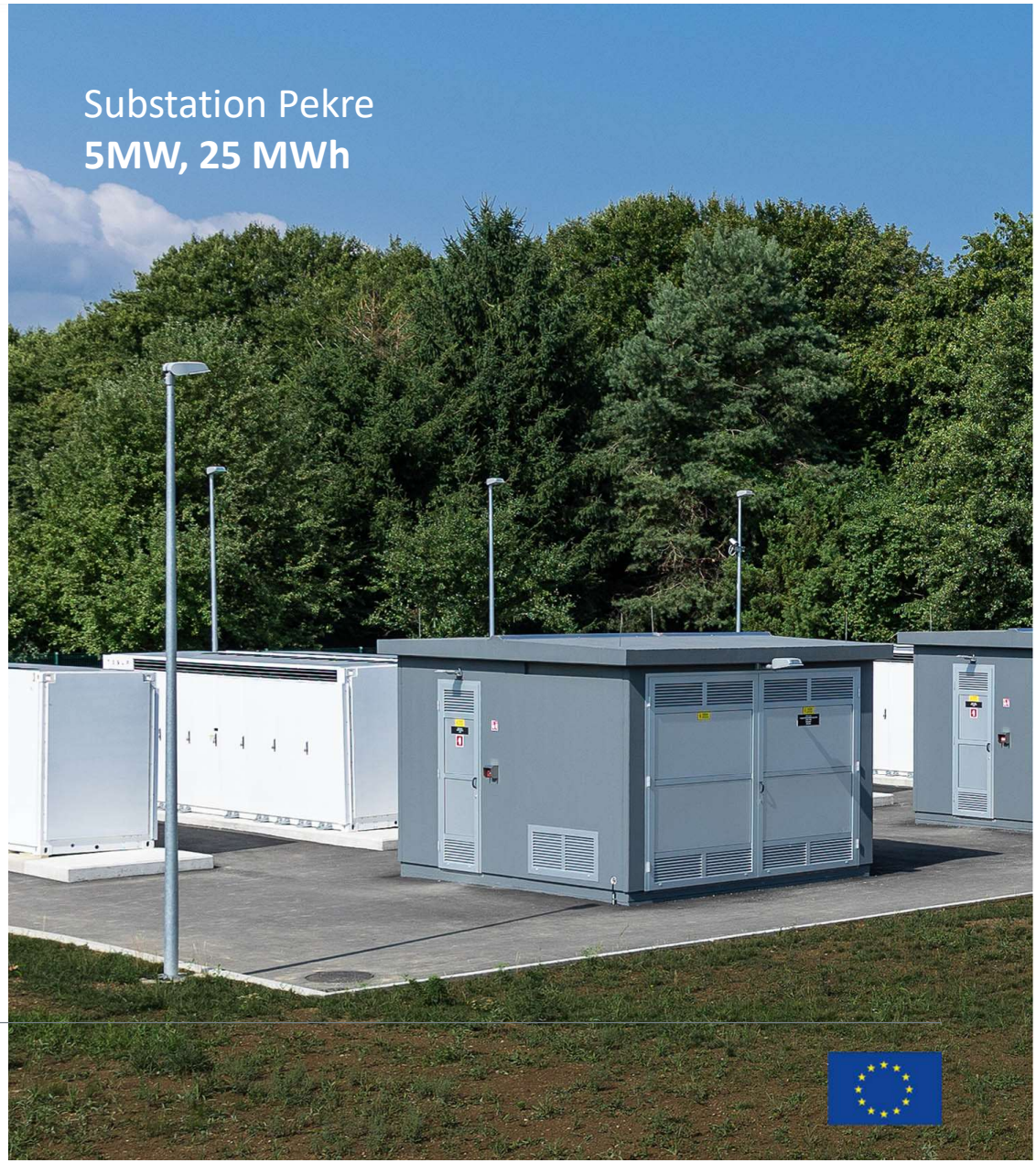

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Dynamic thermal rating systems

- ✓ DTR system allows real-time monitoring of local conditions on the overhead lines (OHL).
- ✓ ELES and HOPS utilize the results of the DTR system to improve the safety of operation and increase the transmission capacity of the network.
- ✓ With the average 15–20% increase in transmission capacities, it is possible to transfer larger quantities of energy from renewable sources in the south of Croatia to the regional markets.

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Dynamic thermal rating systems

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Virtual cross-border control center

- ✓ VVC and VVS within VCBCC (Cross-border Control Centre) is the first case in Europe where neighboring transmission system operators have joined forces in regulating and optimizing the voltage.
- ✓ The VCBCC consists of numerous IT solutions that enable data acquisition from the production of renewable energy sources.
- ✓ Virtual VCBCC provides accurate estimation or forecasting of renewable energy sources production.

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Conclusions

Increased grid flexibility

First step of energy transition

GreenSwitch

New projects

Thank you.

Additional information
available at

www.sincrogrid.eu

Co-financed by the Connecting Europe Facility of the European Union