2nd CIGRE SEERC Colloquium

National strategies for decarbonization of the energy sector and impacts to electric power system

- The case of Bosnia and Herzegovina -

CIGRÉ National Committee of Bosnia and Herzegovina

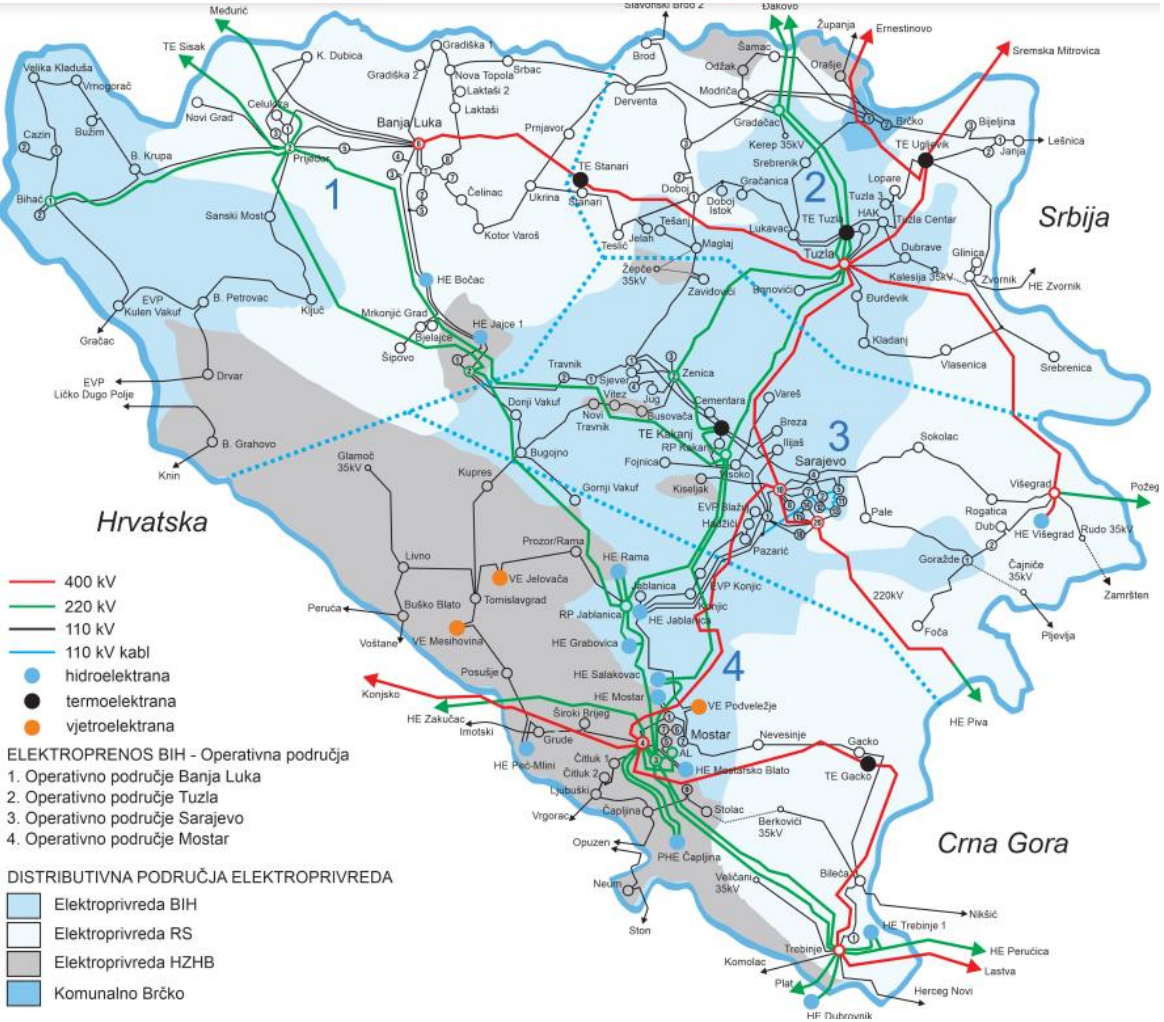
Ljubljana, February 29th, 2024

Presentation outline

- Introduction to BiH´s power system
- BiH´s climate framework
- BiH´s integrated development plan
- BiH´s power system challenges
- BiH´s key future activities by 2030

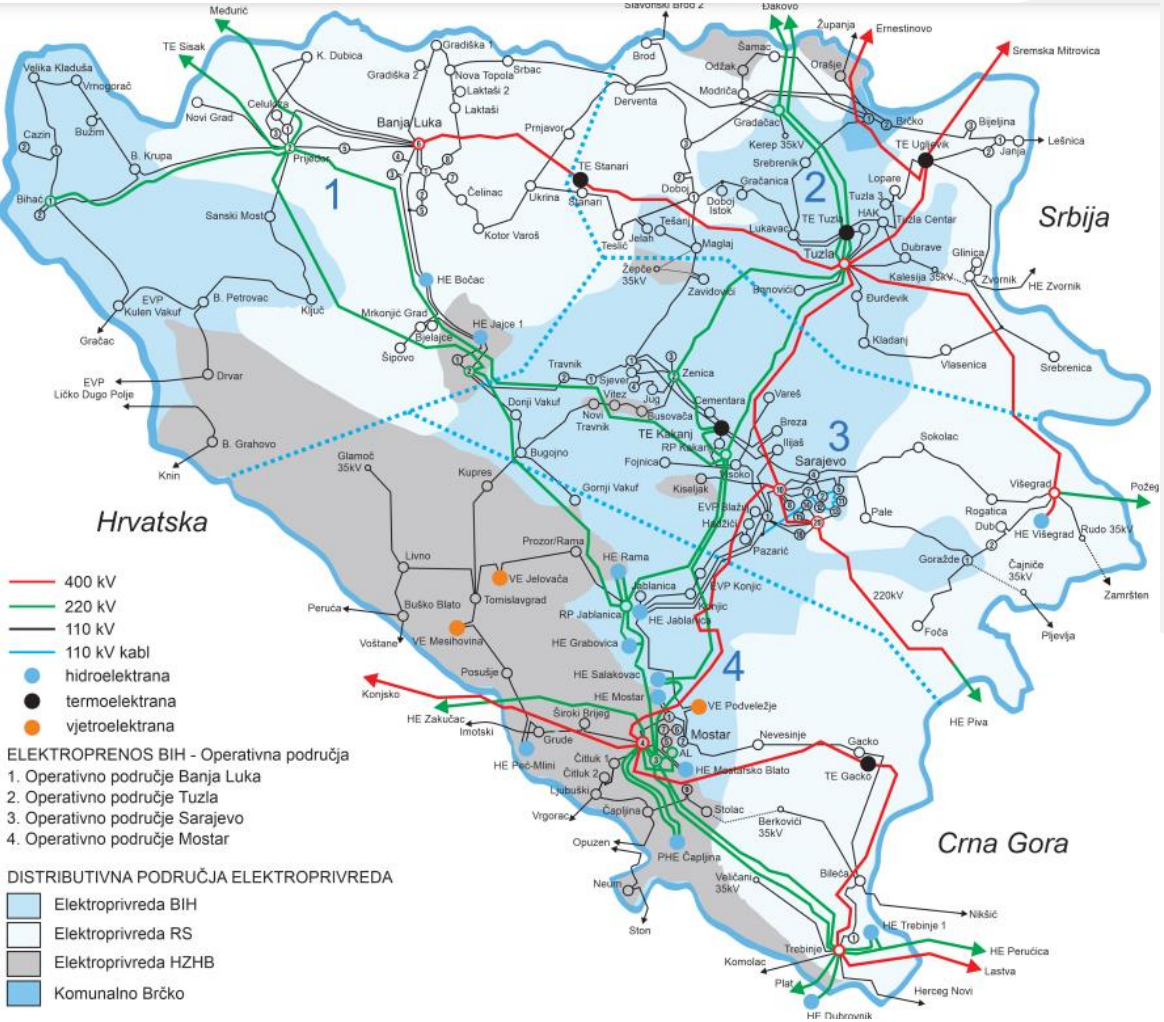
Introduction to BiH´s power system

The power system of BiH in numbers



- 1 ISO BiH
- 1 TSO BiH
- High voltage levels:
  - 440 kV
  - 220 kV
  - 110 kV
- 3 power utilities:
  - EP BiH
  - EP HZHB
  - EP RS
- Several independent power producers (TPP Stanari - 300 MW, WPP Jelovaca – 36 MW, PVPP Petnjik – 29.9 MW)

The power system of BiH in numbers

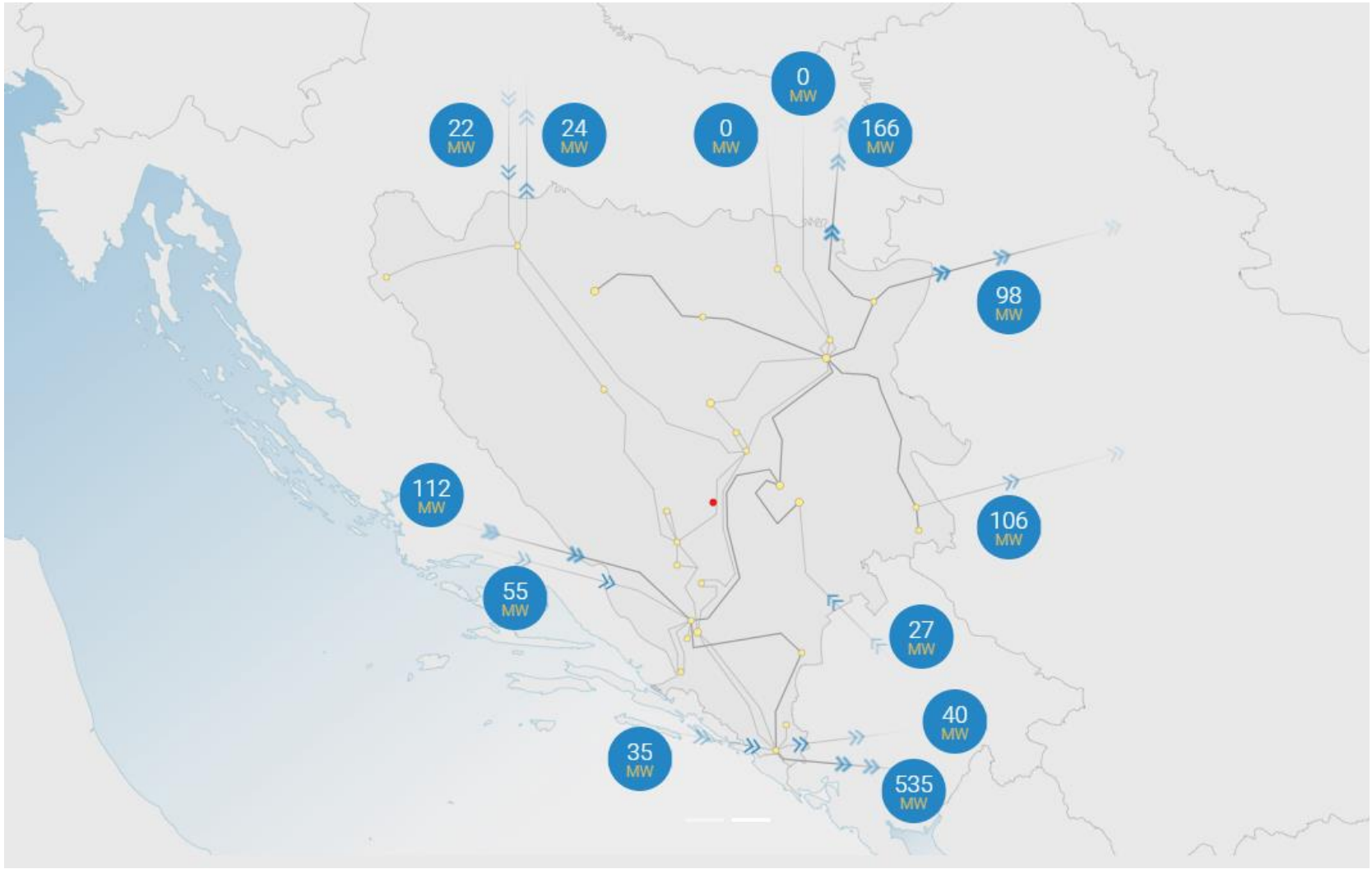


- Total installed capacity: **4,655.62 MW**
  - HPP 2,076.6 MW
  - TPP 2,065 MW
  - WPP 134.6 MW
  - sHPP 181.89 MW
  - PVPP 101.56 MW
  - biogas and biomass facilities 2.71 MW
  - sWPP 0.40 MW
  - industrial power plants 92.85 MW

Coal vs. RES production:

60-65% vs. 40-35%

The power system of BiH in numbers

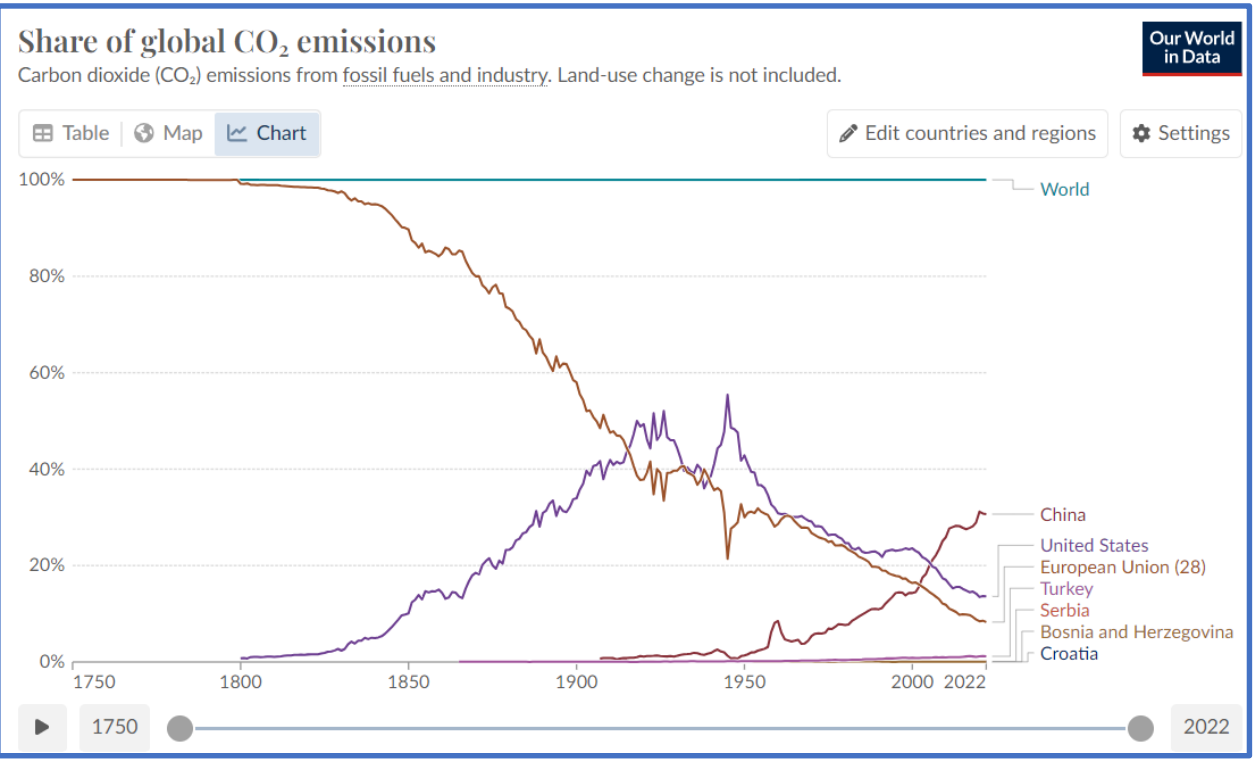


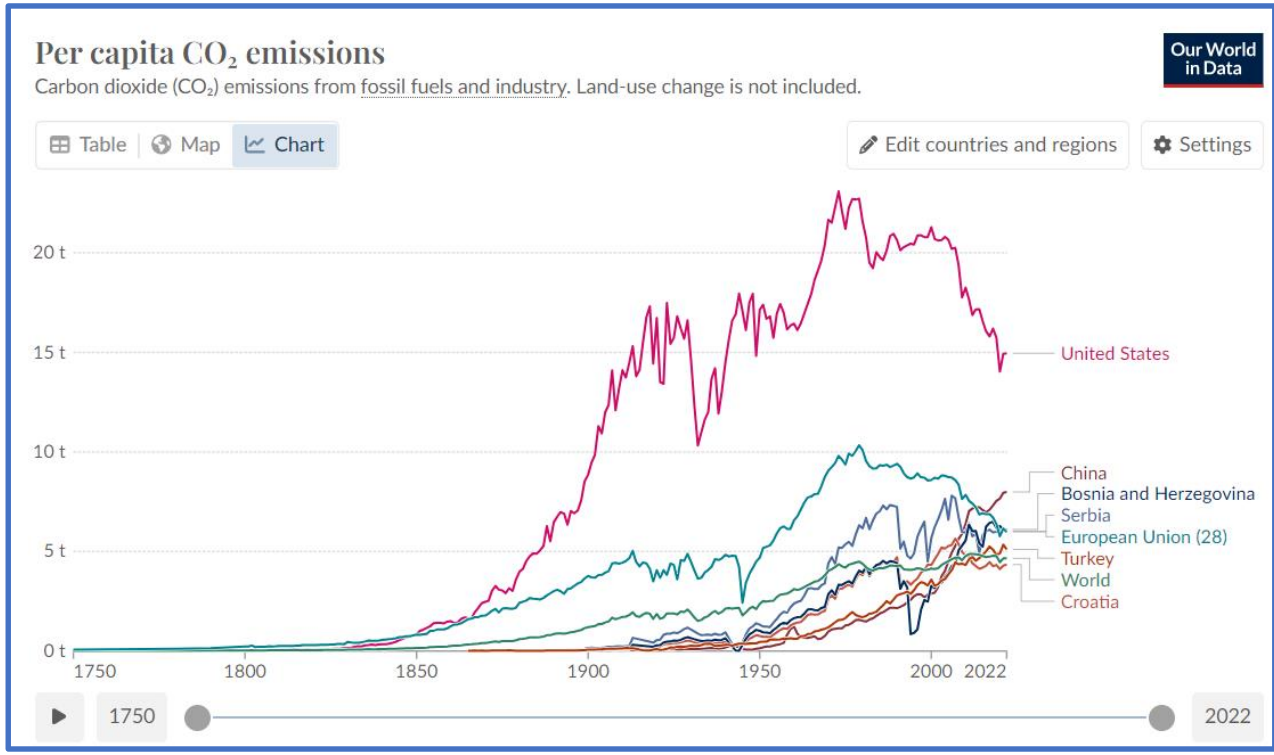
- Av. electricity generation per year: **15 – 17 TWh**
- Av. electricity consumption per year: **12 TWh**

Power cross-border exchange 13.02.2024. at 19:00h, source: ISO BiH web page

BiH´s climate framework

Share of CO_2 emissions





Source: ourworldindata web page

BiH participates with less than 0.05% in global CO_2 emissions.

Energy and climate regulatory framework in BiH

Energy Community Treaty
(2006)

Paris Agreement
NDC
(2015)

Sofia Declaration for the Western Balkans (2020)

Regulation (EU) 2018 / 1999 -
NECP

Decarbonization of the economy

No Climate law on state level.

No ETS - threatening to introduce CBAM from 2026.

BiH´s integrated development plan

Binding targets for BiH by 2030

	Greenhouse gas emissions (GHG)	Share of renewable energy sources	Energy efficiency - Primary energy consumption (PEC)	Energy efficiency - Final energy consumption (FEC)
BiH targets:	15.65 $MtCO_{2eq}$	43.62%	6.84 Mtoe	4.34 Mtoe
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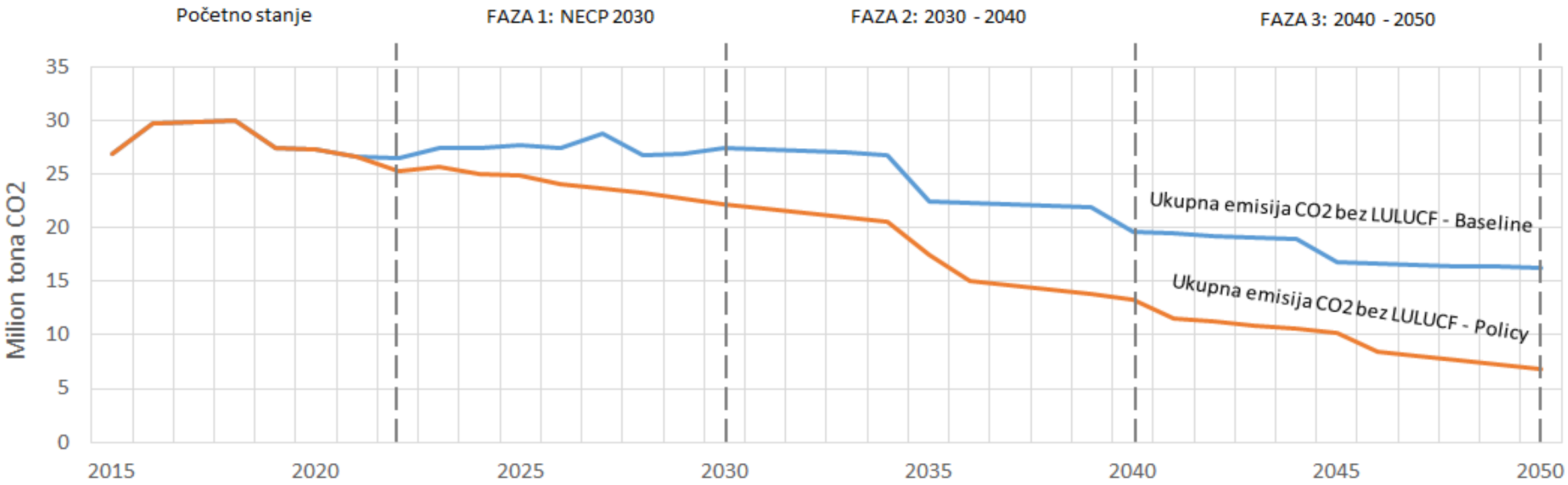
EU targets for BiH:	15.65 MtCO2eq	43.62%	6.50 Mtoe	4.34 Mtoe

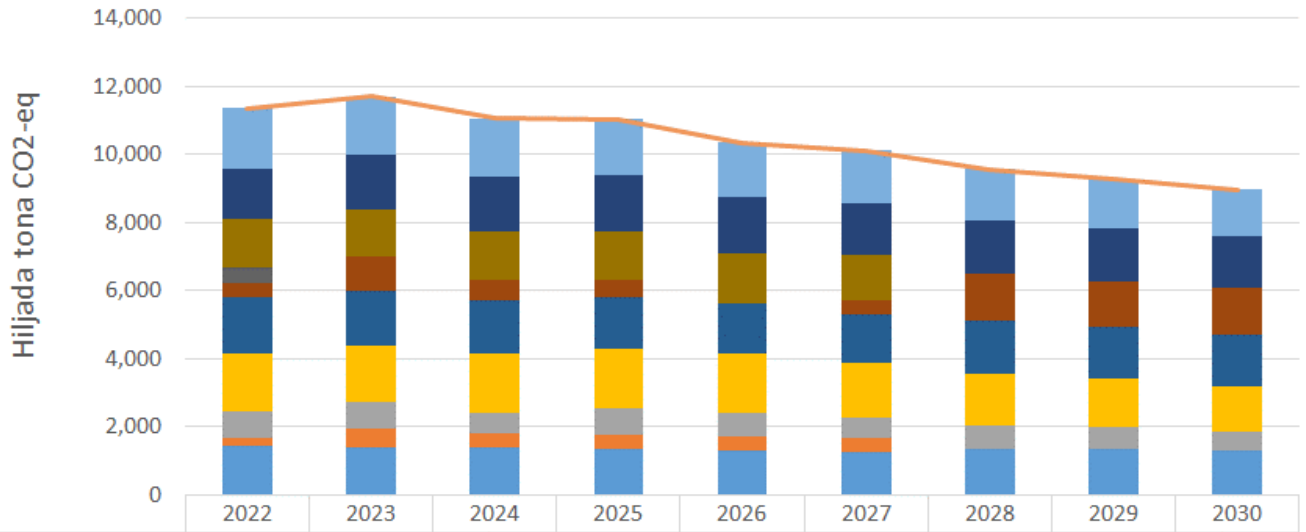
Binding targets – Greenhouse gas emissions



Source: draft NECP BiH, June 2023.

Total CO2eq emission with LULUCF in 2030	**15.65 MtCO2eq**
Reduction of emissions in 2030 compared to 1990 with LULUCF	**41.21%**

Binding targets – Greenhouse gas emissions



	2022	2023	2024	2025	2026	2027	2028	2029	2030
TE Ugljevik 300 MW	1,785.0	1,728.8	1,694.7	1,641.9	1,599.4	1,536.3	1,493.9	1,442.7	1,384.5
TE TZ6 215 MW	1,469.9	1,584.4	1,594.2	1,635.7	1,649.1	1,518.7	1,584.3	1,547.1	1,501.9
TE TZ5 200 MW	1,405.5	1,404.3	1,453.5	1,448.8	1,467.6	1,369.4	-	-	-
TE TZ3 100 MW	486.1	-	-	-	-	-	-	-	-
TE TZ 4 200 MW	394.2	980.7	593.7	495.3	-	397.1	1,355.4	1,337.8	1,370.6
TE Stanari 300 MW	1,659.0	1,603.1	1,568.6	1,517.5	1,477.0	1,418.3	1,547.9	1,520.7	1,499.9
TE Petroleum products	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5
TE KK7 230 MW	1,692.8	1,691.3	1,712.2	1,744.9	1,759.1	1,592.0	1,525.0	1,442.4	1,365.7
TE KK6 110 MW	779.2	764.5	629.6	788.2	669.5	635.7	689.7	638.1	514.0
TE KK5 110 MW	220.4	540.6	424.2	423.1	419.4	409.2	-	-	-
TE Gacko 300 MW	1,448.2	1,400.1	1,370.7	1,326.8	1,292.1	1,241.4	1,355.7	1,338.8	1,321.3
Ukupno emisije iz proizvodnje električne energije	11,341.2	11,698.5	11,042.0	11,023.0	10,333.7	10,118.6	9,552.4	9,268.1	8,958.5

Changes in the power sector are the key for achieving the set GHG emission reduction by 2030.

deSOx&deNOx
TPP Kakanj 7
TPP Tuzla 6

Source: draft NECP BiH, June 2023.

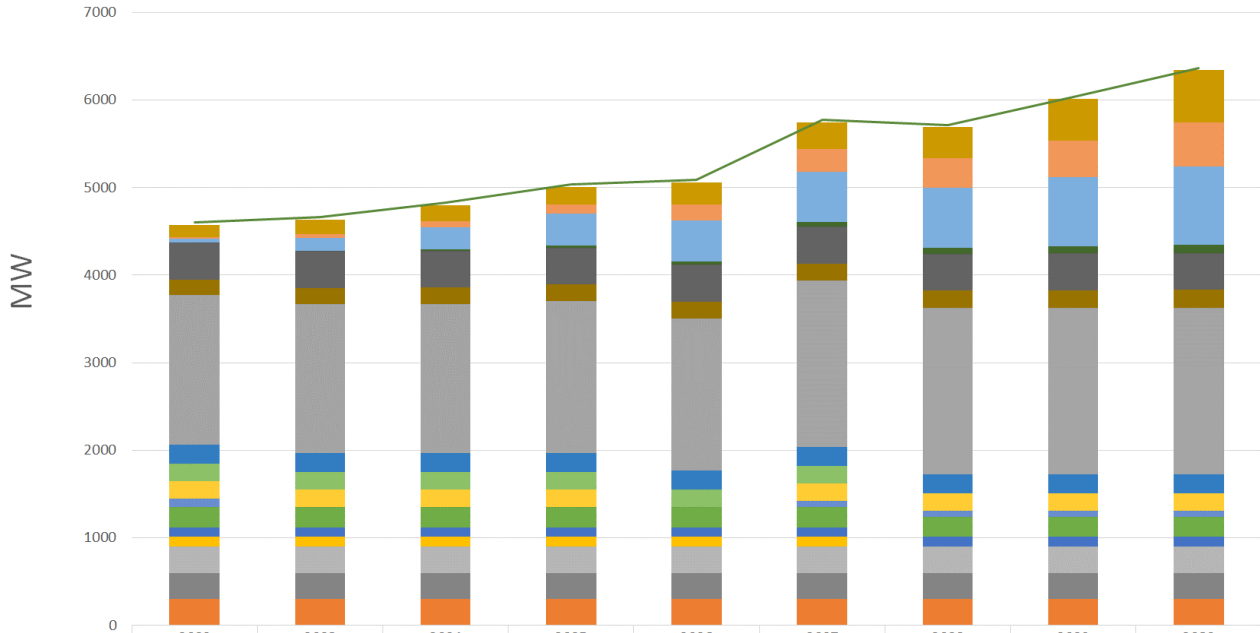
New power generation facilities by 2030.

Thermal power plants:

- Decommissioning of 410 MW.
- No new thermal power plants.
- Repowering, cofiring coal and biomass.

Renewable energy sources:

- Commissioning of over 2,000 MW in new RES based facilities.
- The largest increase in PVPP of over 1,500 MW.



	2022	2023	2024	2025	2026	2027	2028	2029	2030
Vjetroelektrane - tržište	136.40	158.40	180.40	202.40	252.40	302.40	352.40	476.20	600.00
Fotonaponske elektrane - prosumeri	24.00	48.00	72.00	100.00	180.00	260.00	340.00	420.00	500.00
Fotonaponske elektrane - tržište	41.32	148.66	255.99	363.33	470.66	578.00	685.33	792.67	900.00
Fotonaponske elektrane - industrija	0.88	1.00	14.00	27.00	40.00	53.00	66.00	79.00	92.00
Pumpne hidroelektrane	420.00	420.00	420.00	420.00	420.00	420.00	420.00	420.00	420.00
Male hidrolektrane	180.00	183.35	186.70	190.05	193.40	196.75	200.10	203.45	206.80
Velike hidroelektrane	1,705.00	1,705.00	1,705.00	1,740.00	1,740.00	1,900.00	1,900.00	1,900.00	1,900.00
TE TZ6 215 MW	215.00	215.00	215.00	215.00	215.00	215.00	215.00	215.00	215.00
TE TZ5 200 MW	200.00	200.00	200.00	200.00	200.00	200.00	-	-	-
TE TZ 4 200 MW	200.00	200.00	200.00	200.00	-	200.00	200.00	200.00	200.00
TE TZ3 100 MW	100.00	-	-	-	-	70.00	70.00	70.00	70.00
TE KK7 230 MW	230.00	230.00	230.00	230.00	230.00	230.00	230.00	230.00	230.00
TE KK6 110 MW	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00
TE KK5 110 MW	110.00	110.00	110.00	110.00	110.00	110.00	-	-	-
TE Stanari 300 MW	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
TE Ugljevik 300 MW	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
TE Gacko 300 MW	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
Gasna elektrana	-	-	-	-	-	-	-	-	-
Total	4,607.2	4,662.2	4,830.1	5,037.1	5,089.0	5,770.9	5,712.9	6,0[illegible]	6,364.3

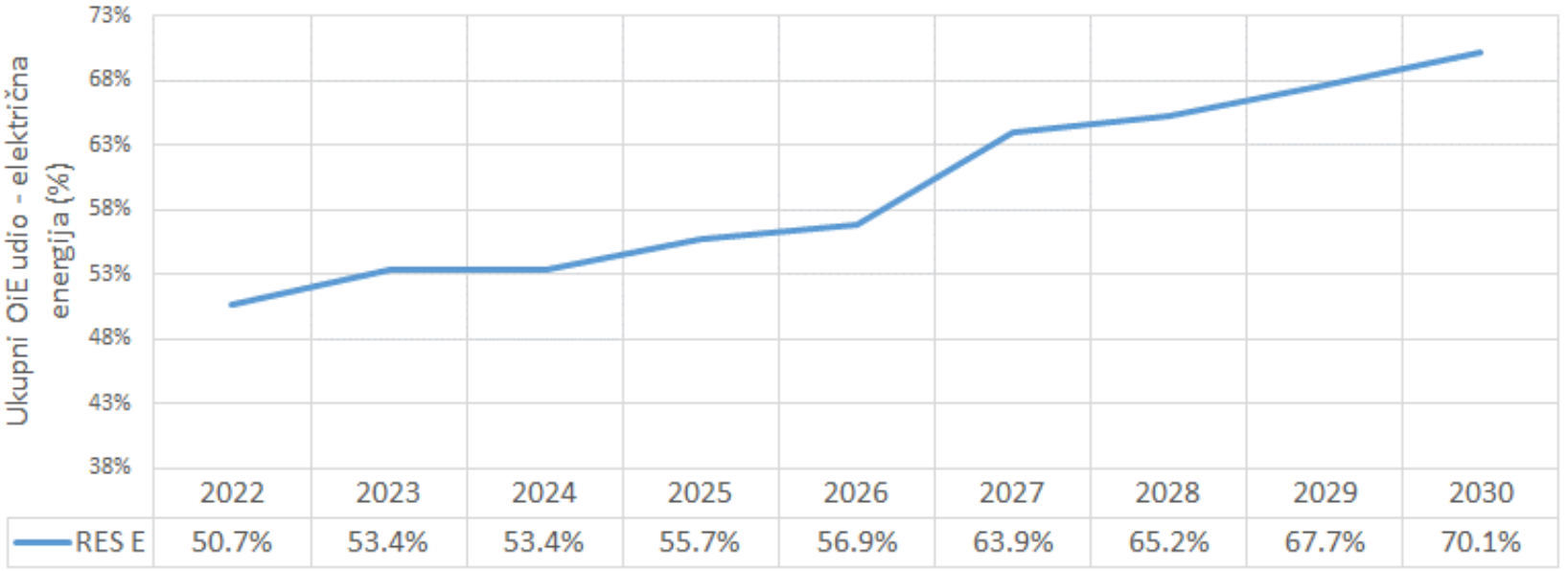
Source: draft NECP BiH, June 2023.

New power generation facilities by 2030.

Renewable energy sources share in electricity consumption 2022-2030.

A yearly increase of over 244 MW in new RES based facilities.

A yearly increase of over 382 GWh in new RES based facilities.



	2022	2023	2024	2025	2026	2027	2028	2029	2030
RES E	50.7%	53.4%	53.4%	55.7%	56.9%	63.9%	65.2%	67.7%	70.1%

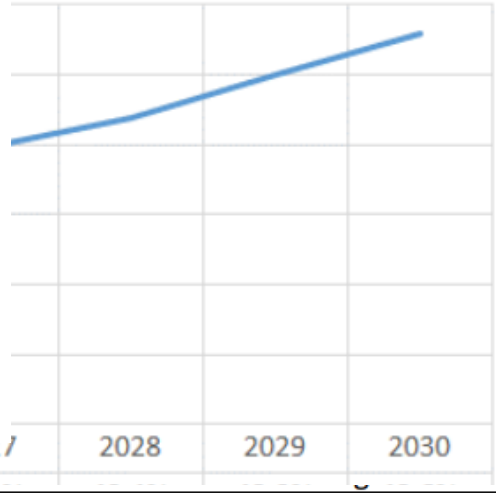
Source: draft NECP BiH, June 2023.

Binding targets – Renewable energy sources share

Renewable energy sources share in gross final energy consumption 2022-2030.

A total increase of 14 ktoe in gross final energy consumption from RES in heating and cooling.

ktoe	2030
	ktoe
Geothermal energy (without low-temperature geothermal heat energy from the application of heat pumps)	-
Solar energy	-
Biomass	1,309.4
solid biomass	1,309.4
biogas	-
liquid biofuels	-
Thermal energy from the use of heat pumps	5.37
aero-heat pumps	5.37
geothermal heat pumps	
hydro-heat pumps	



A total increase of 67 ktoe in gross final energy consumption from RES in transport.

ktoe	2030		
	Renewable electricity	Liquid biofuels	Hydrogen
Passenger transport			
Road			
Cars	1.61	79.13	1.60
Buses	-	-	0.04
Railway	0.85	-	-
Air	-	-	-
Freight transport			
Road	-	20.77	-
Railway	5.84	-	-

A total increase of 81 ktoe (≈ 940 GWh) in RES.

BiH´s power system challenges

Power system flexibility and power exchange

Bosnia and Herzegovina is the only country in the region without an organized electricity market.

No large scale storage facilities are planned recently.

Grid capacities

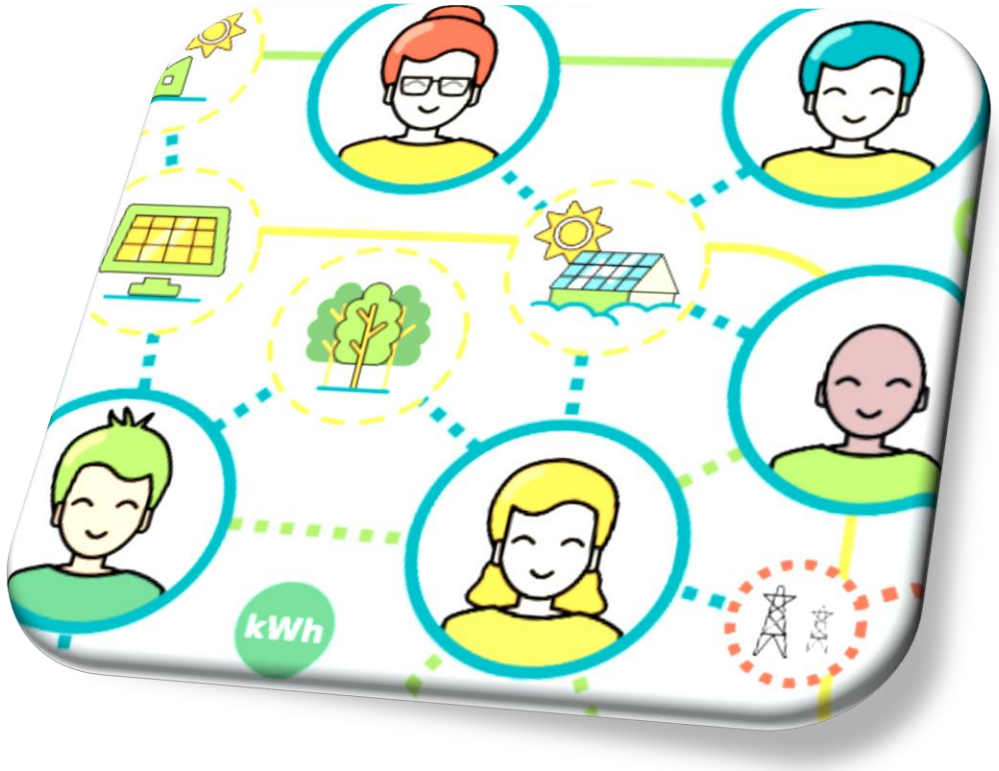
	Grid connection agreement	Conditions for connection	Request for issuing conditions for connection
No of power plants	6	26	41
Installed capacity [MW]	335.3	1995.9	3480.3

Insufficient hosting capacity (distribution and transmission level) for the new power plants.

- **400 kV line Banja Luka – Lika (BiH - HR)**
- **2x400 kV line Visegrad – Bajina Basta – Pljevlja (BiH – SRB - CG)**

Citizens' initiatives

- **Prosumers**
- **Renewable energy communities**



- With the adoption of the new law, citizens' initiatives became possible.
- Still waiting for the adoption of by-laws (rulebook on certification) and accounting methodologies that will enable a more massive occurrence.

Just transition

Over 10,000 workers engaged in the coal mine industry.

cca. 310 MW by 2028

1 x 80 MWth before 2030
1 x 80 MWth after 2030

BiH´s key future activities

Key activities

- Establishment of an organized electricity market
- Establishment of greenhouse gas emissions trading schemes (ETS)
- Establishment of the guarantee of origin system
- Implementation of just transition in coal regions
- Adoption of the necessary legal framework and strategic documents
- Rationalization of administrative procedures
- Increase power system flexibility
- Develop network infrastructure
- Intensify research

THANK YOU FOR YOUR ATTENTION

CIGRÉ National Committee
of Bosnia and Herzegovina

Ljubljana, February 29th, 2024