National strategies for decarbonization of Energy sector and impacts to Electric Power System

Second CIGRE SEERC Colloquium

Uros Kerin, ELES, Slovenija

29. 2. 2024

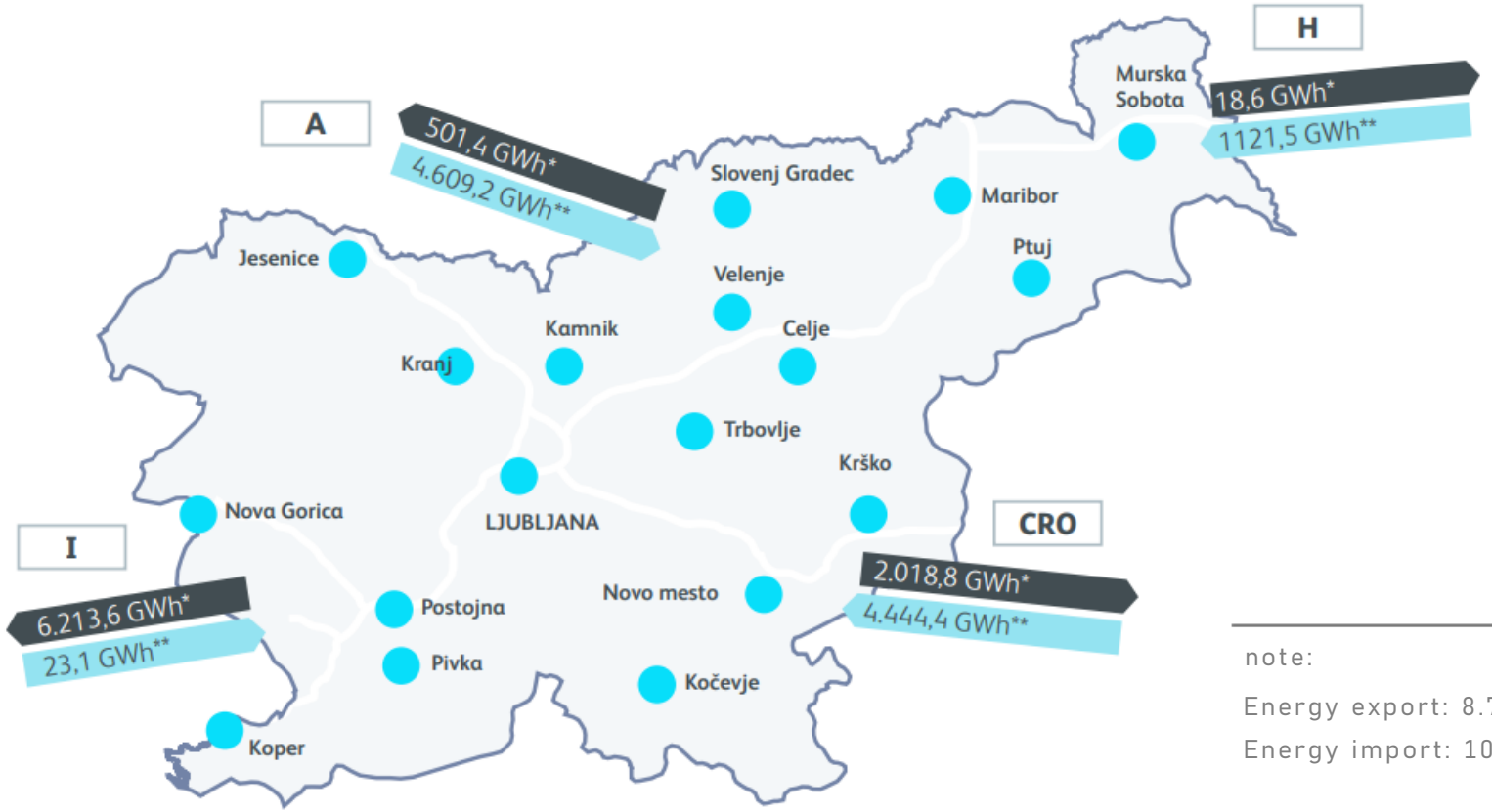
Electric energy generation in Slovenia in 2023

- Thermal power generation: 26.31 %
- Nuclear power generation: 22.83 %
- RES power generation from biogas: 0.95 %
- RES power generation from biomass: 0.27 %
- RES Power generation from solar PV: 7.58 %
- RES hydro power generation: 41.99 %

Source:

REPUBLIC OF SLOVENIA
MINISTRY OF THE ENVIRONMENT, CLIMATE AND ENERGY

International power exchange and flow in 2022

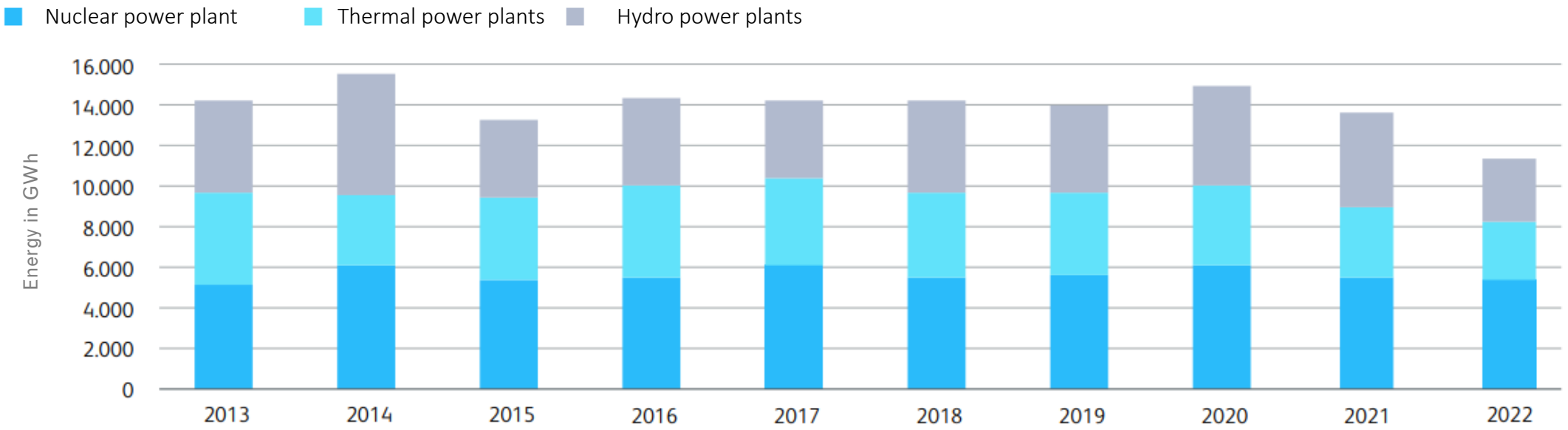


note:

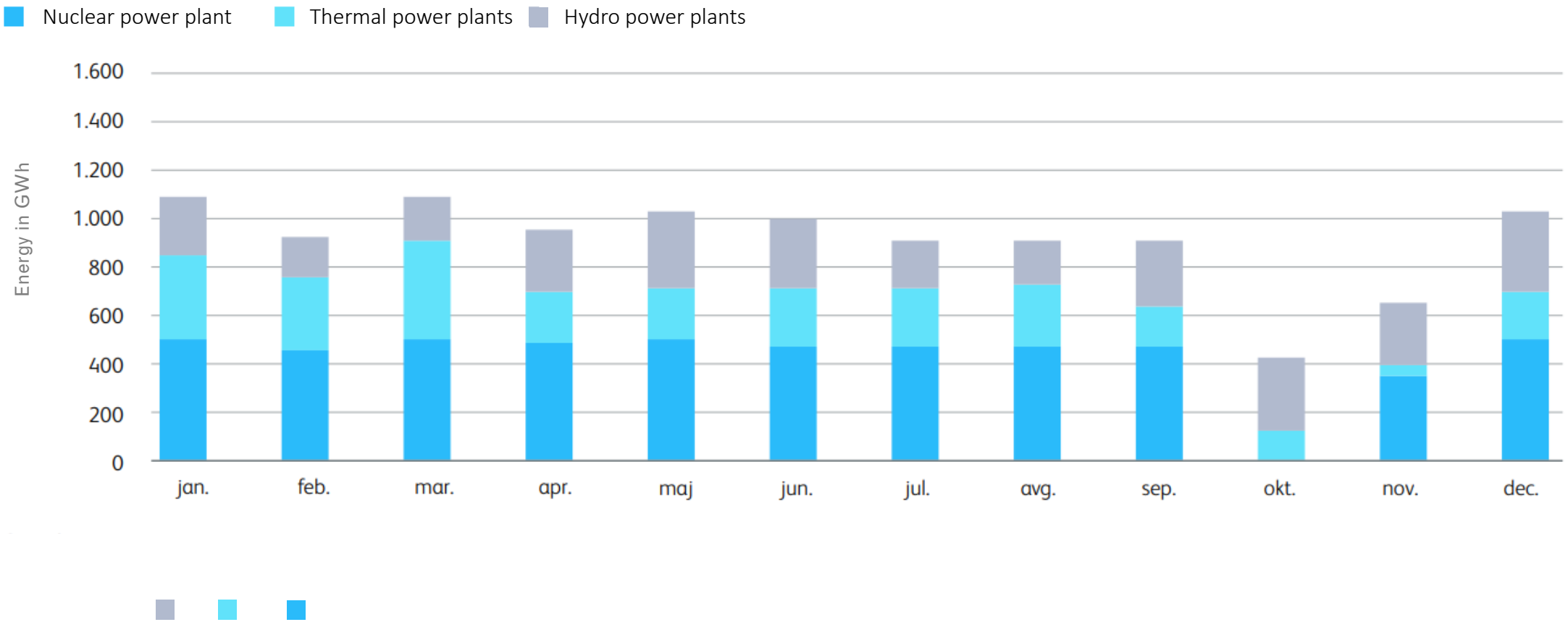
Energy export: 8.752,3 GWh

Energy import: 10.198,2 GWh

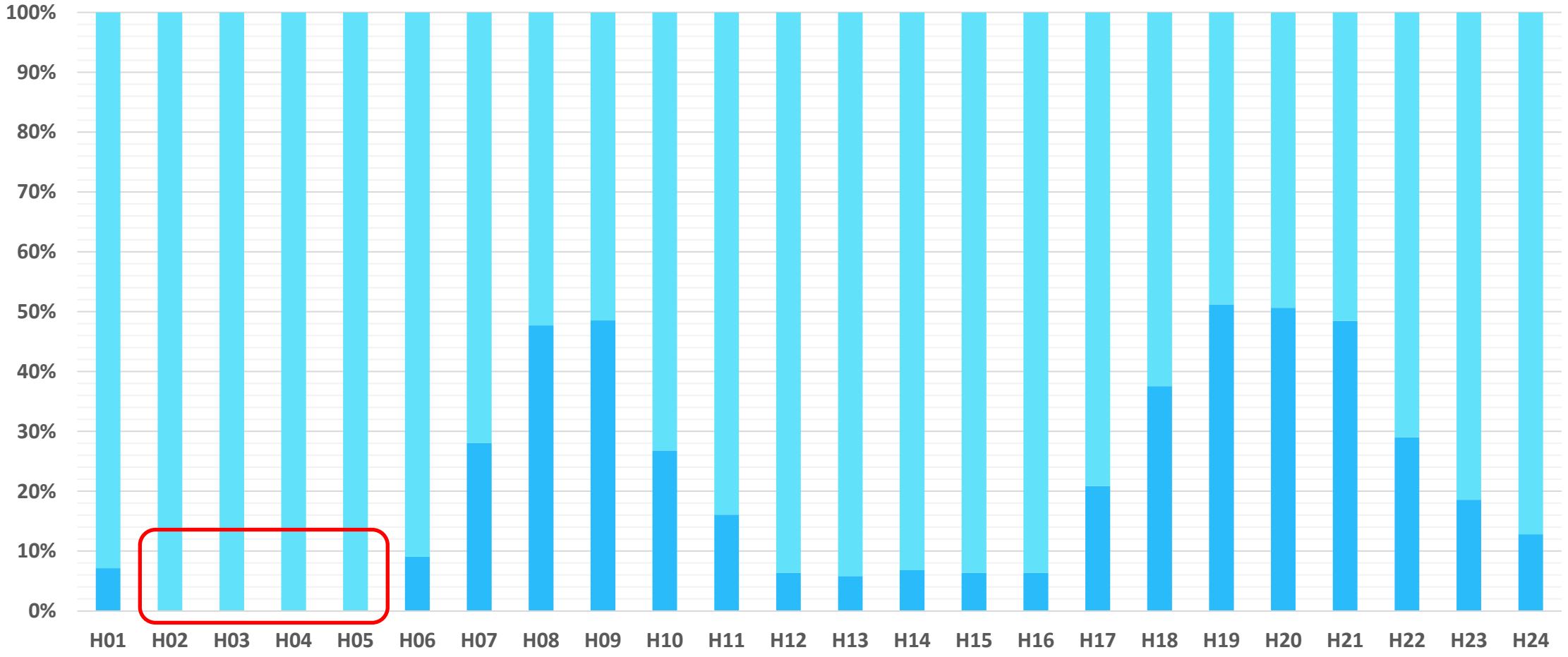
Electric energy generation and infeed to transmission network from 2013 to 2022



Electric energy generation and infeed to transmission network per month in 2022

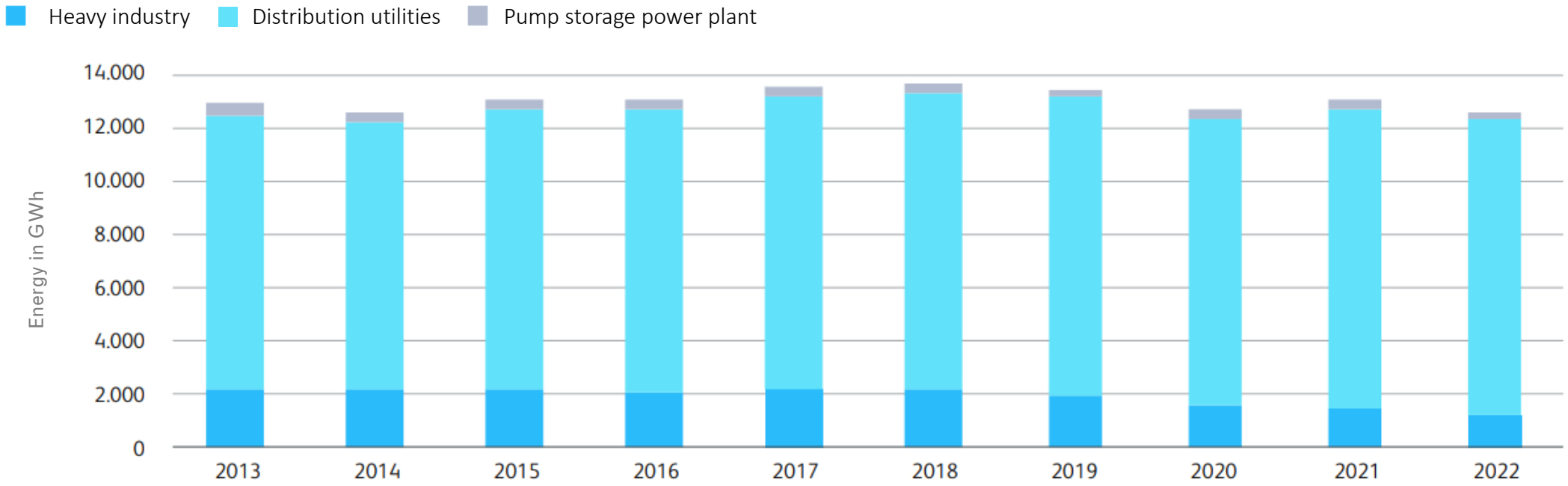


Electric energy generation and infeed at transmission level October 20th 2022



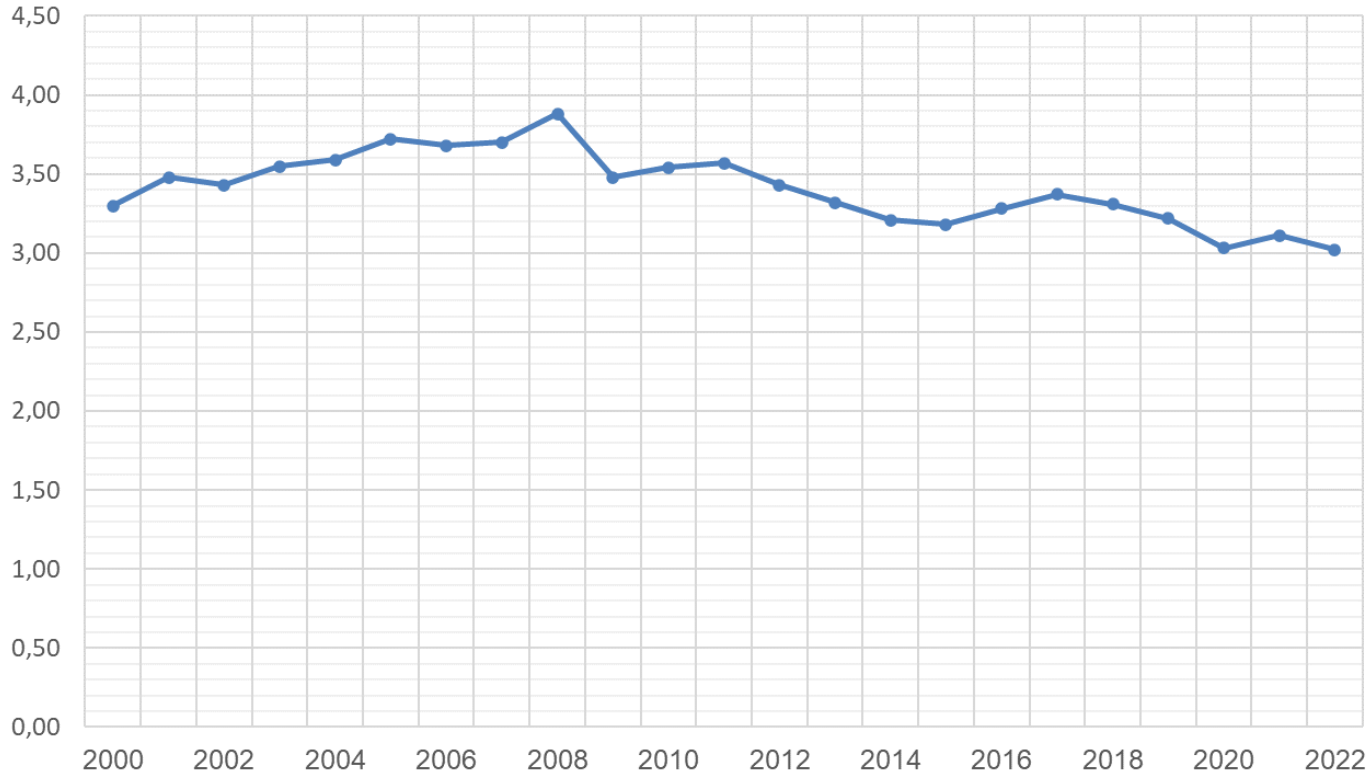
Source: ELES POS SRT

Electric energy consumption from transmission network from 2013 to 2022



Energy supply

Energy supply per person 2000 – 2022 in toe /person



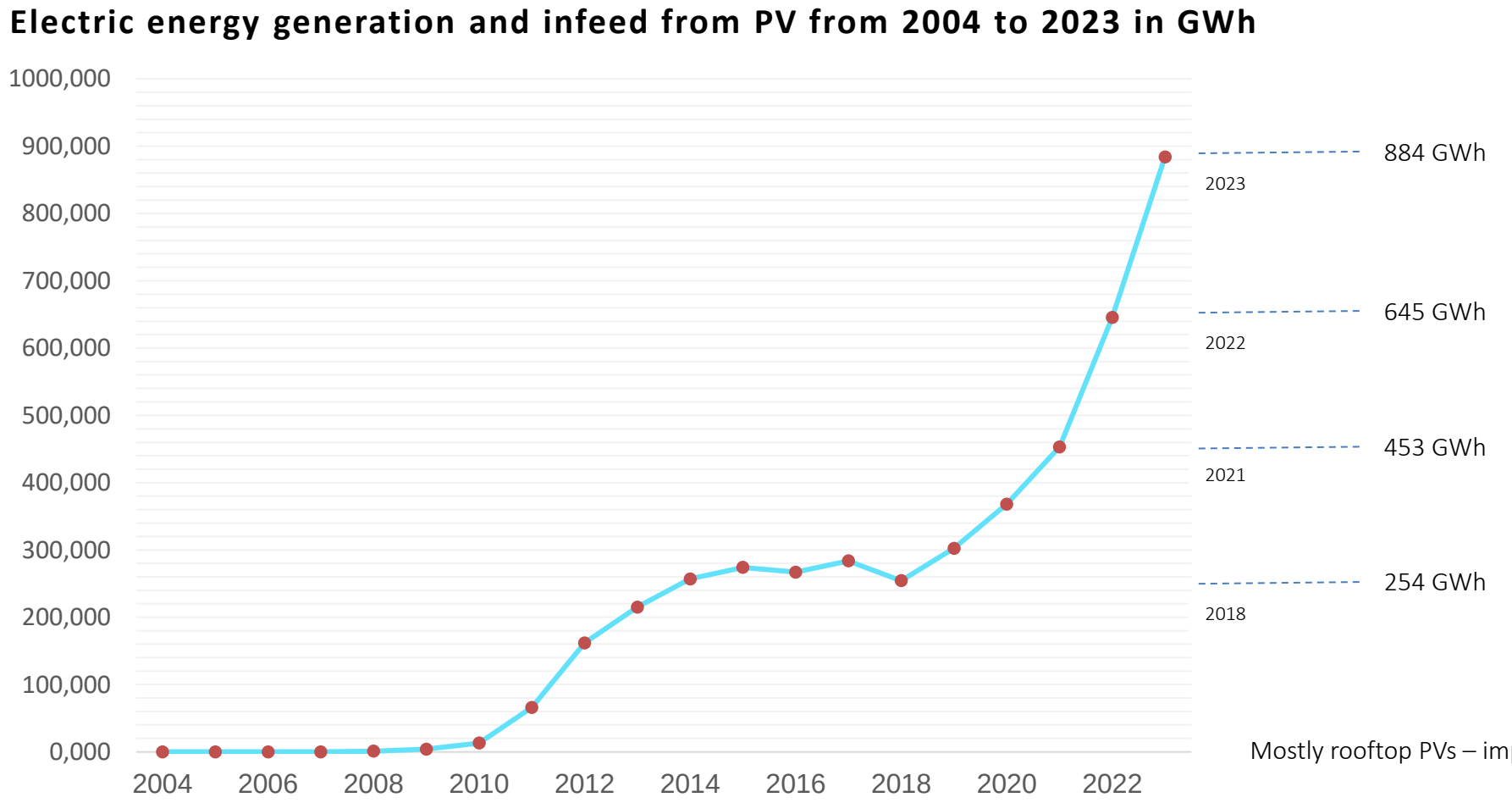
toe = tones of oil equivalent

1 toe = 11.63 MWh

Source:

REPUBLIC OF SLOVENIA
STATISTICAL OFFICE

Renewable sources

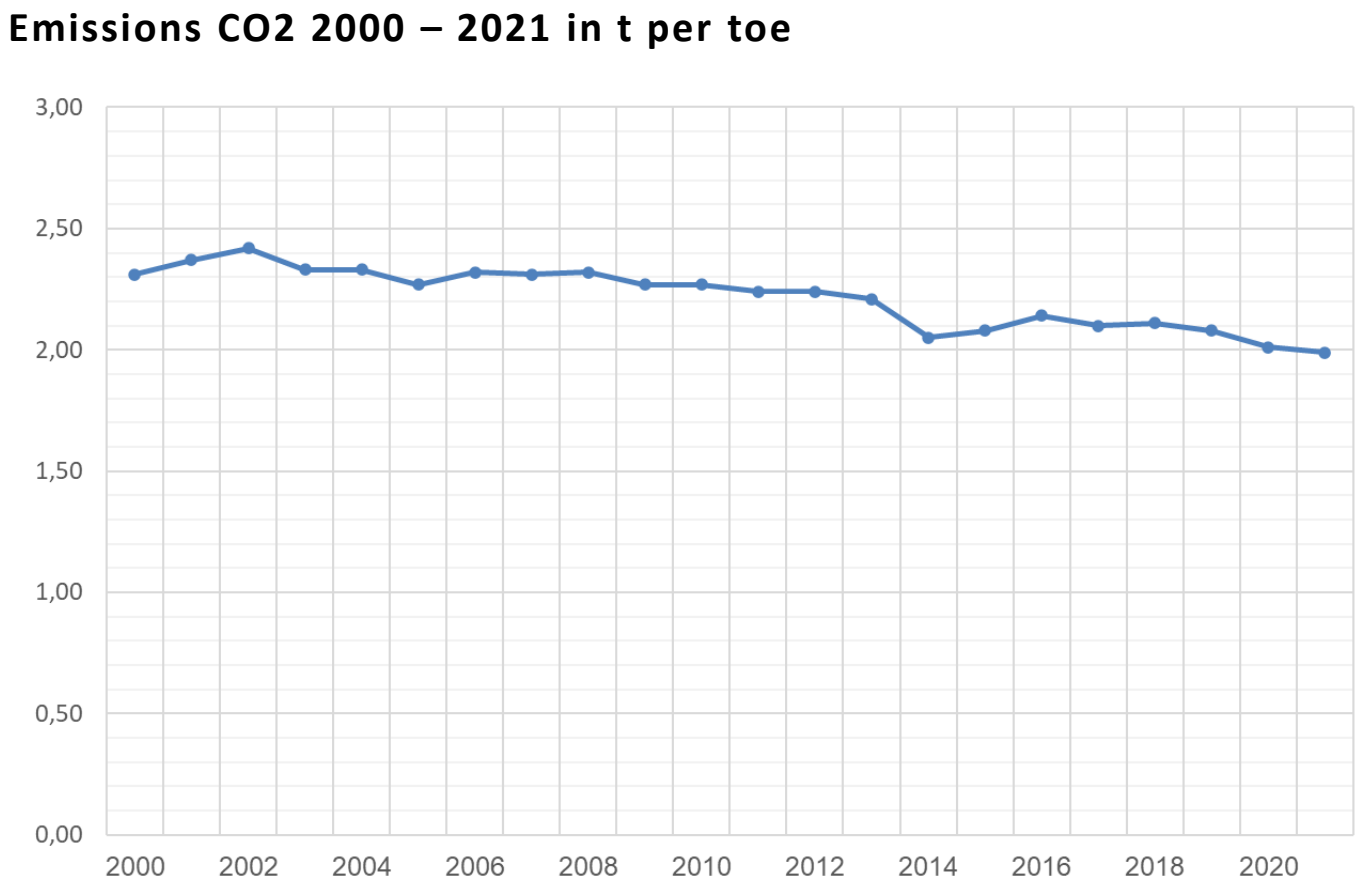


Mostly rooftop PVs – impact on distribution grid

Source:

REPUBLIC OF SLOVENIA
STATISTICAL OFFICE

CO2 emissions per total energy supply



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REPUBLIC OF SLOVENIA
STATISTICAL OFFICE

Green energy transition – five cornerstones of national activities

1. **Renewable energy and energy efficiency**

2. **Sustainable renovation of buildings**

3. **Clean and safe environment**

4. **Sustainable mobility**

5. **Circular economy – resource efficiency**

Source:

REPUBLIC OF SLOVENIA
GOV.SI

Green energy transition – five cornerstones of national activities

1. **Renewable energy and energy efficiency**
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Source:
REPUBLIC OF SLOVENIA
GOV.SI

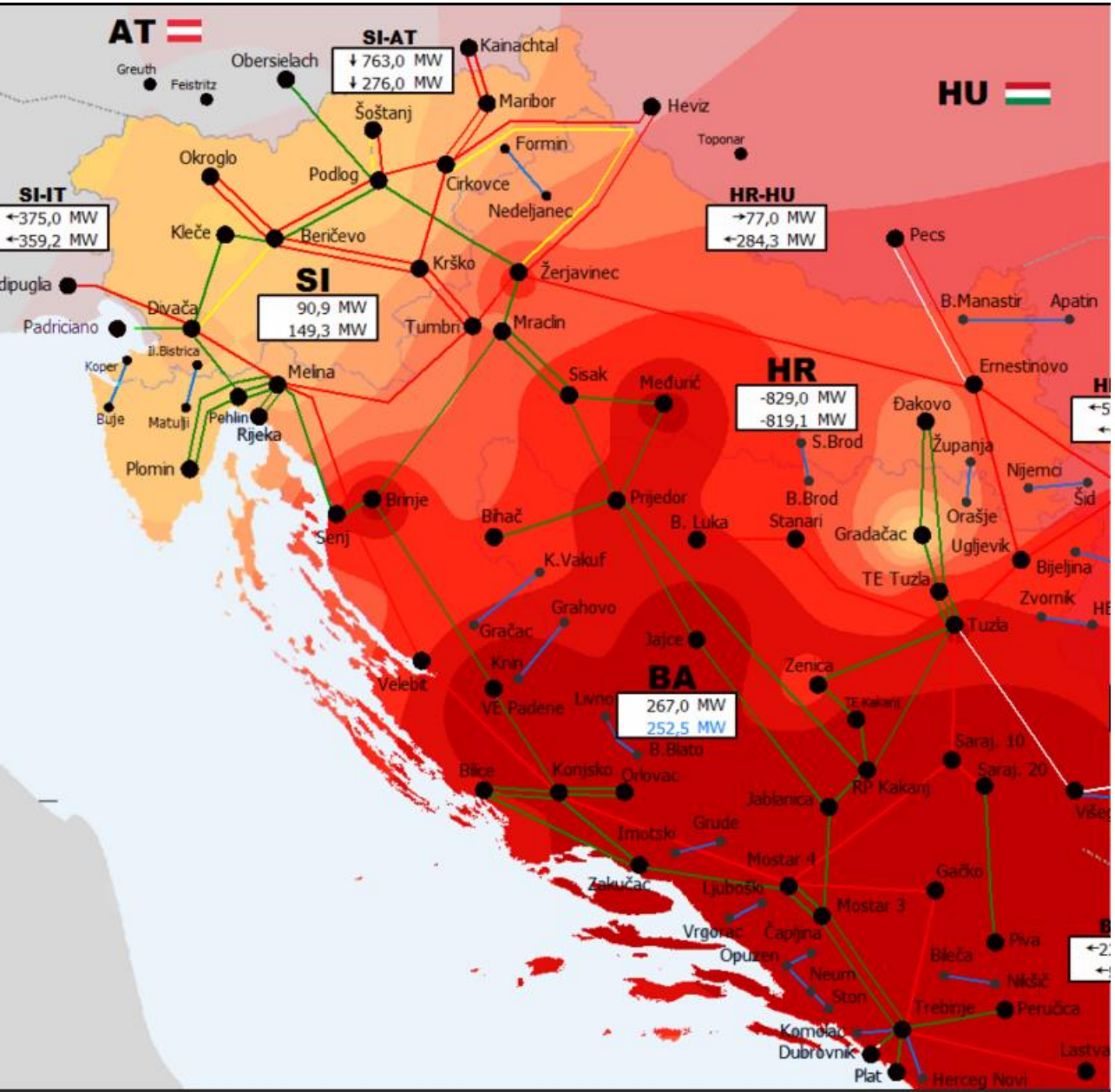
SINCRO.GRID

Compensation devices

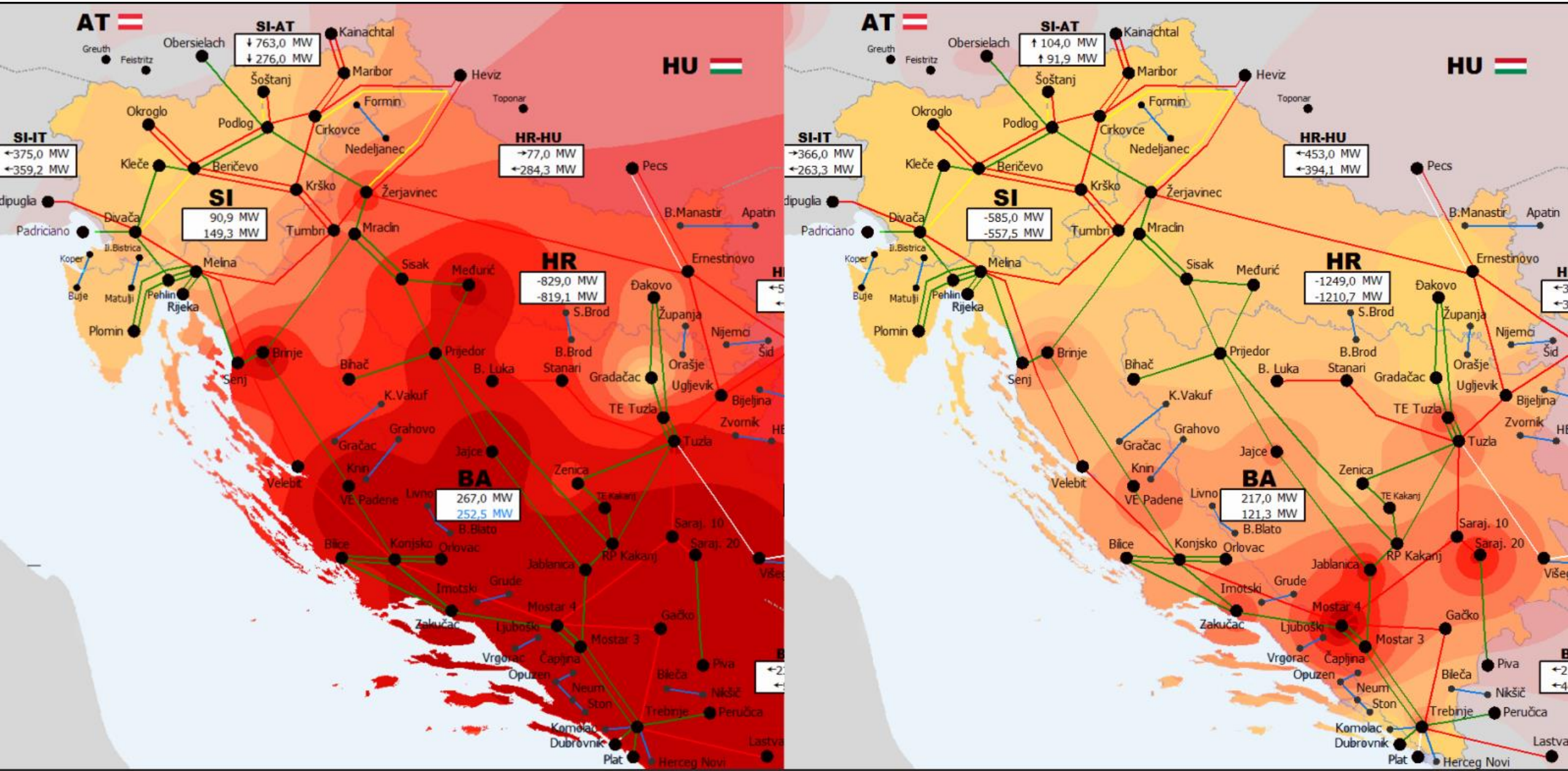
1	VSR - 150 Mvar / 400kV SS Divača
2	MSCDN + 100 Mvar / 400 kV SS Divača
2	VSR - 150 Mvar / 400kV SS Cirkovce
3	STATCOM +/- 150 Mvar / 400 kV SS Beričevo
4	VSR - 200 Mvar /220kV SS Melina
5	VSR - 100 Mvar / 220 kV SS Mraclin
6	SVC +40/-250 Mvar /220 kV SS Konjsko

SINCRO.GRID

SINCRO.GRID Voltage regulation



SINCRO.GRID Voltage regulation



GreenSwitch

ELES

ELES

Elektro Celje

elektro gorenjska

Elektro Ljubljana

HEP OPERATOR DISTRIBUCIJSKOG SUSTAVA

HOPS

Kärnten Netz
EIN UNTERNEHMEN DER KELAG

01

Increasing operational efficiency and transmission grid controllability in Croatia and Slovenia

SSSC, HTLS, DTR, WAMS…

02

Sector-coupling integration (power, heat, mobility) in Slovenia

Heavy-duty and fast EV charging stations, transformer waste-heat recovery

03

Increasing distribution grid efficiency, security of supply, and cross-border and renewable energy sources (RES) hosting capacity in the distribution grids of Austria, Croatia and Slovenia

Substation automation, HTLS, VSR, ADMS…

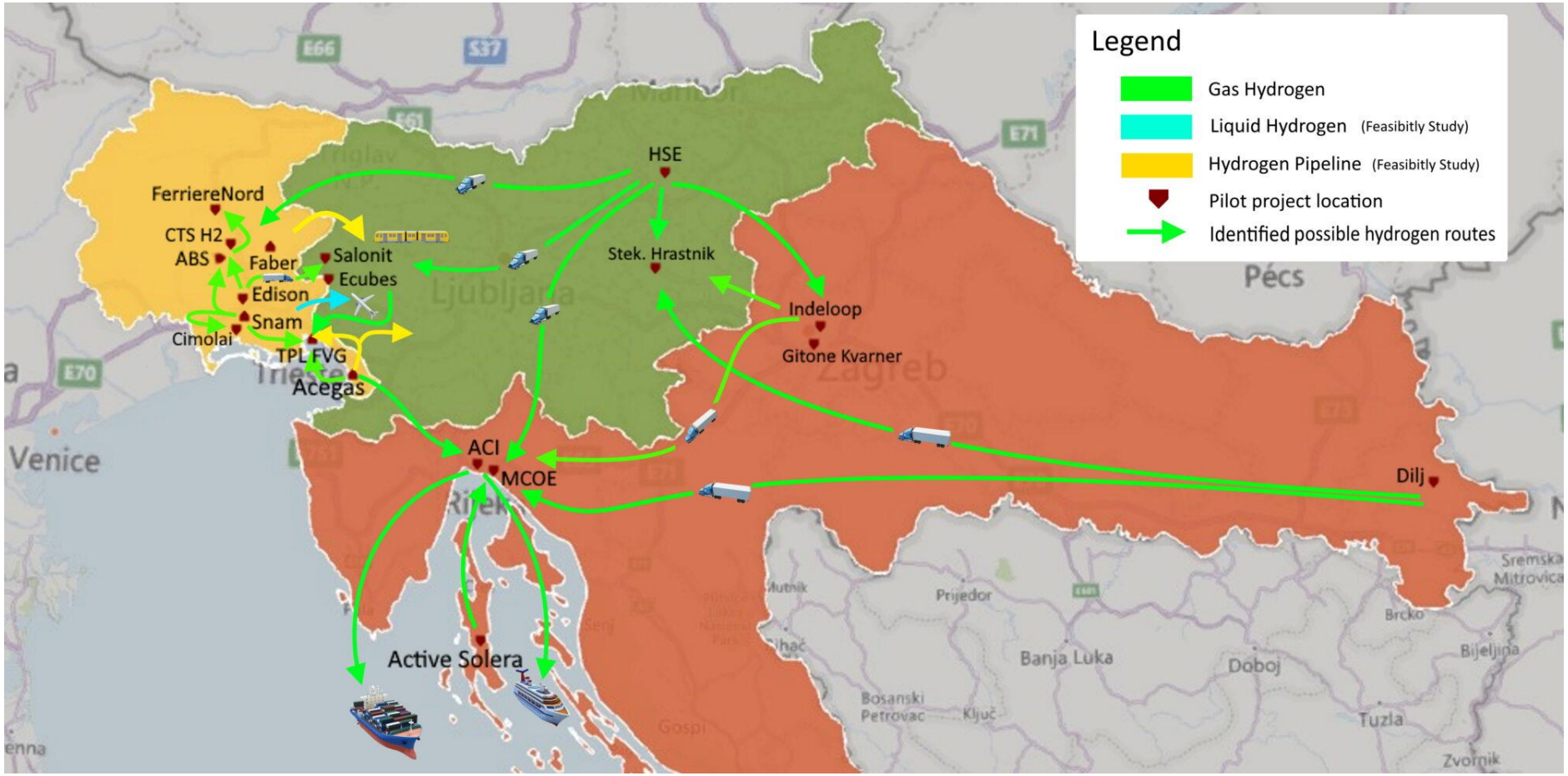
Static synchronous series compensator

- pilot facility operation 2014
  - similar layout and components to STATCOM
- commercial solution 2021
  - no power transformer
  - modular structure
  - on towers, mobile platforms, light, compact

HYDROGEN DEVELOPMENTS

Slovenia, Italy, Croatia, Spain, Belgium

34 partners



Source:

HYDROGEN DEVELOPMENTS

hse

GEN ENERGIJA

energetika ljubljana

ELES

ELES

Elektro Ljubljana

elektro gorenjska

PETROL

TALUM

Plinovodi
Povezani z energijo

SOLVERA LYNX

TPV AUTOMOTIVE

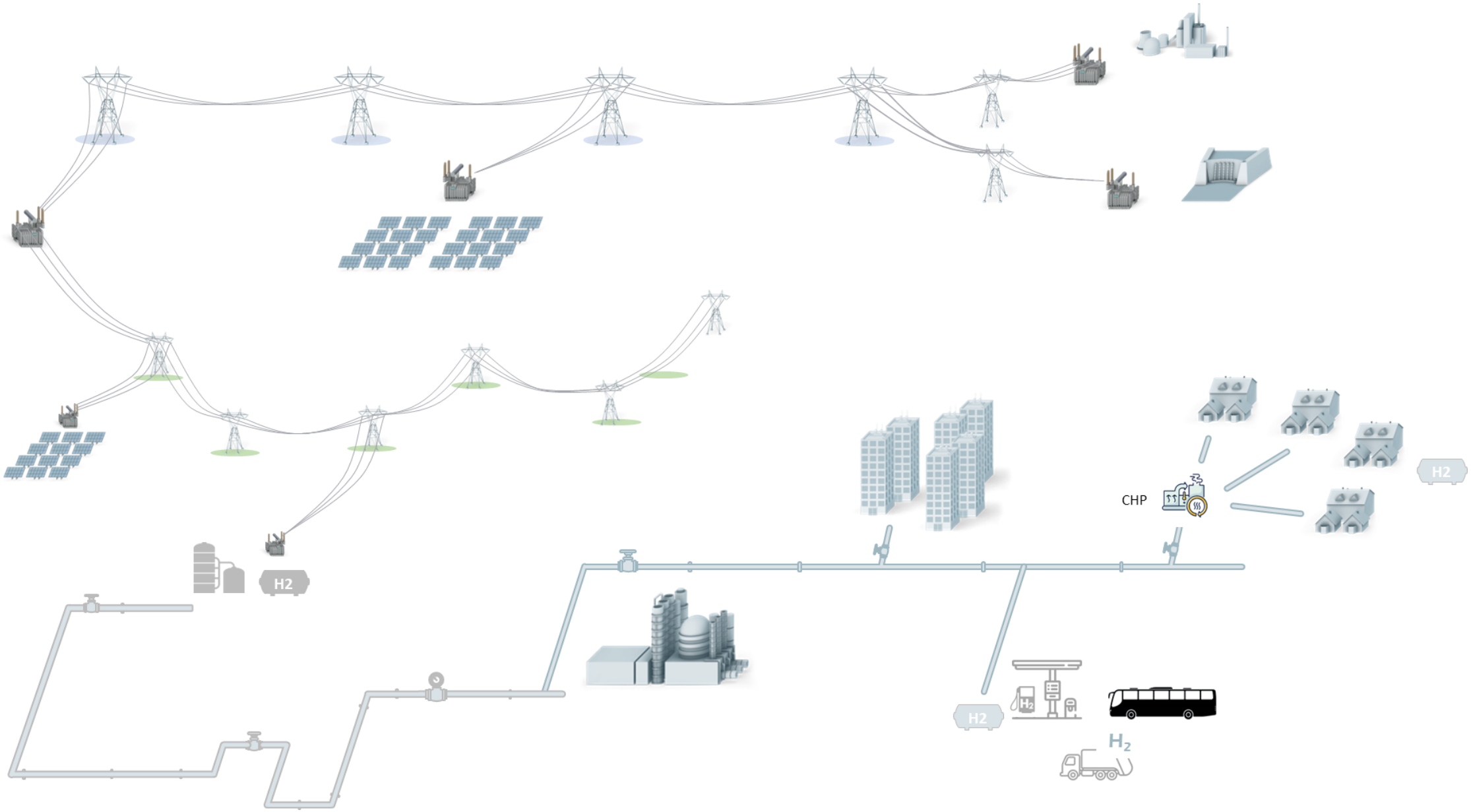
OBČINA AJDOVŠČINA

Mestna občina Ljubljana

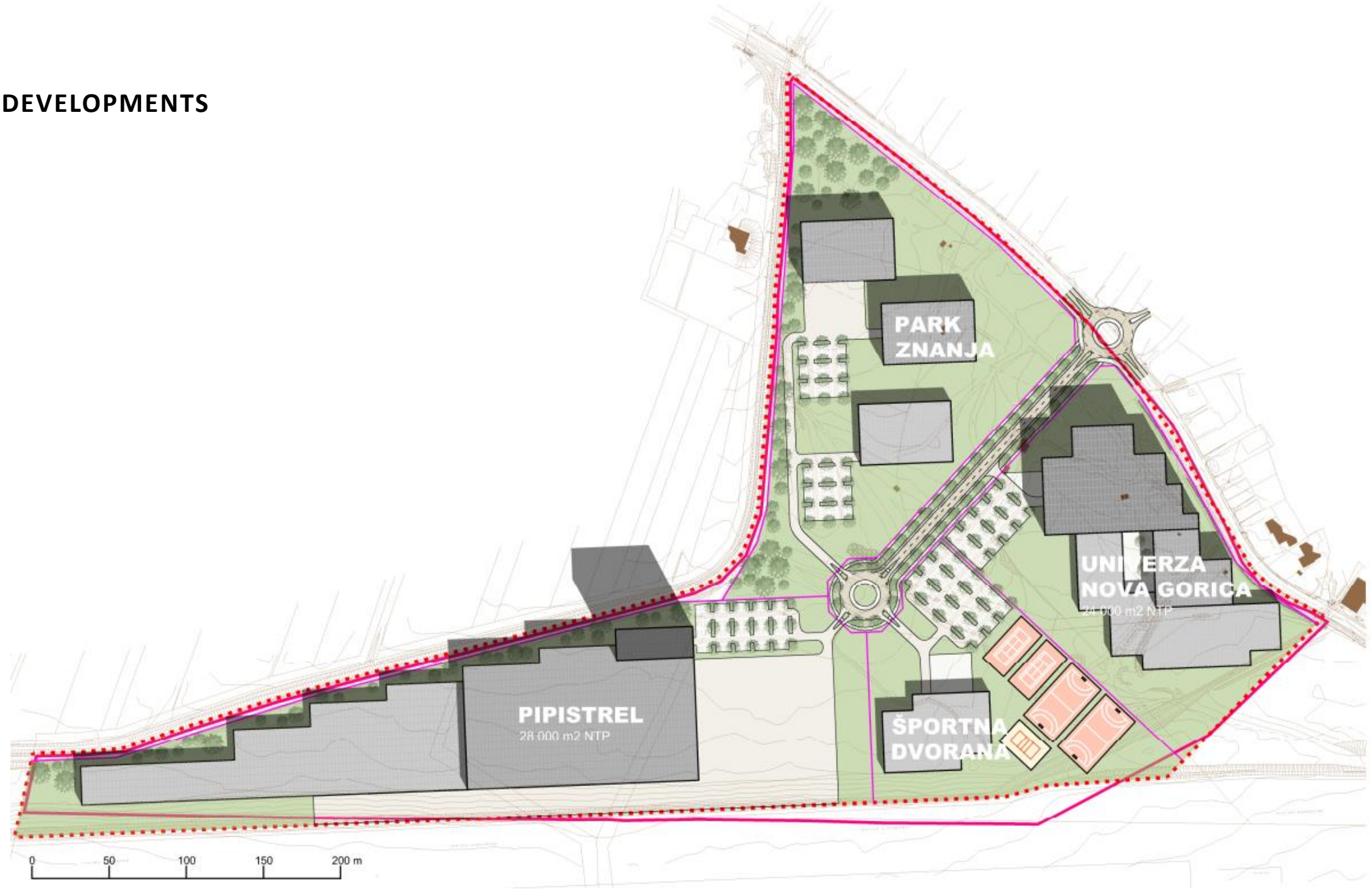
MESTNA OBČINA KRANJ

SJBC | Slovenia-Japan Business Council

HYDROGEN DEVELOPMENTS



HYDROGEN DEVELOPMENTS



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