

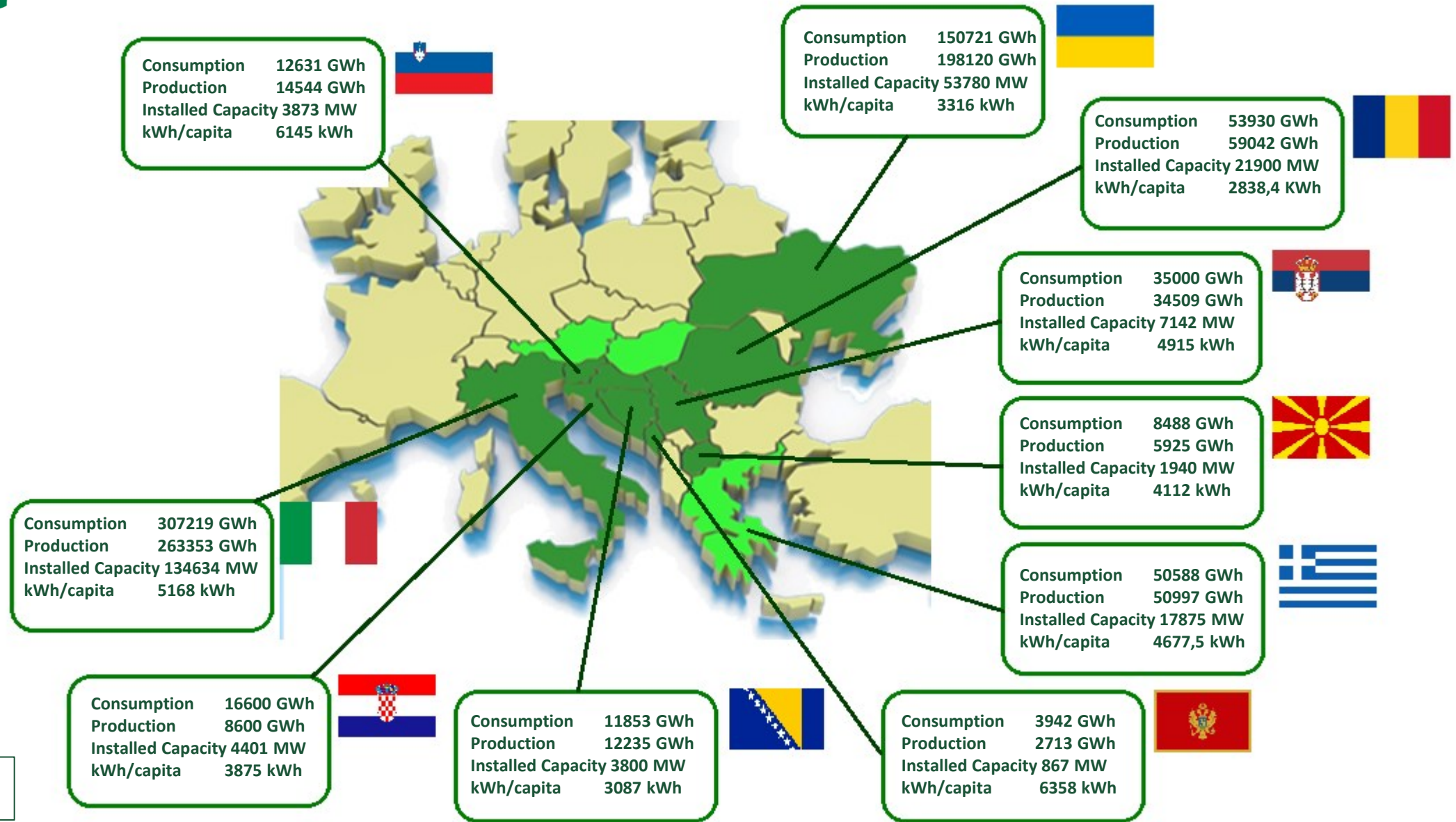


SAPIENZA
UNIVERSITÀ DI ROMA

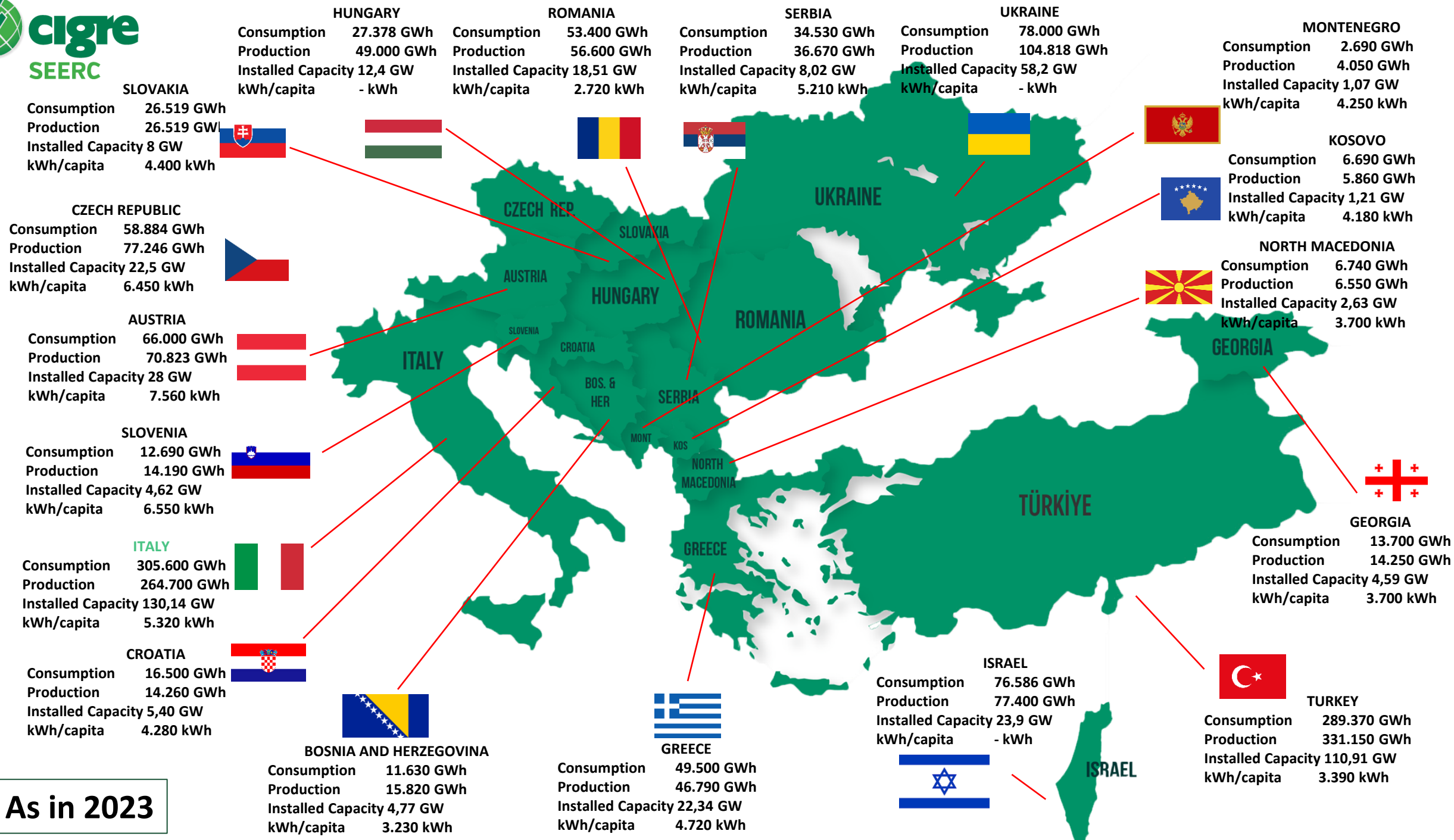
2025 Questionnaire Results



Massimo Pompili, Luigi Calcara - University of Roma La Sapienza



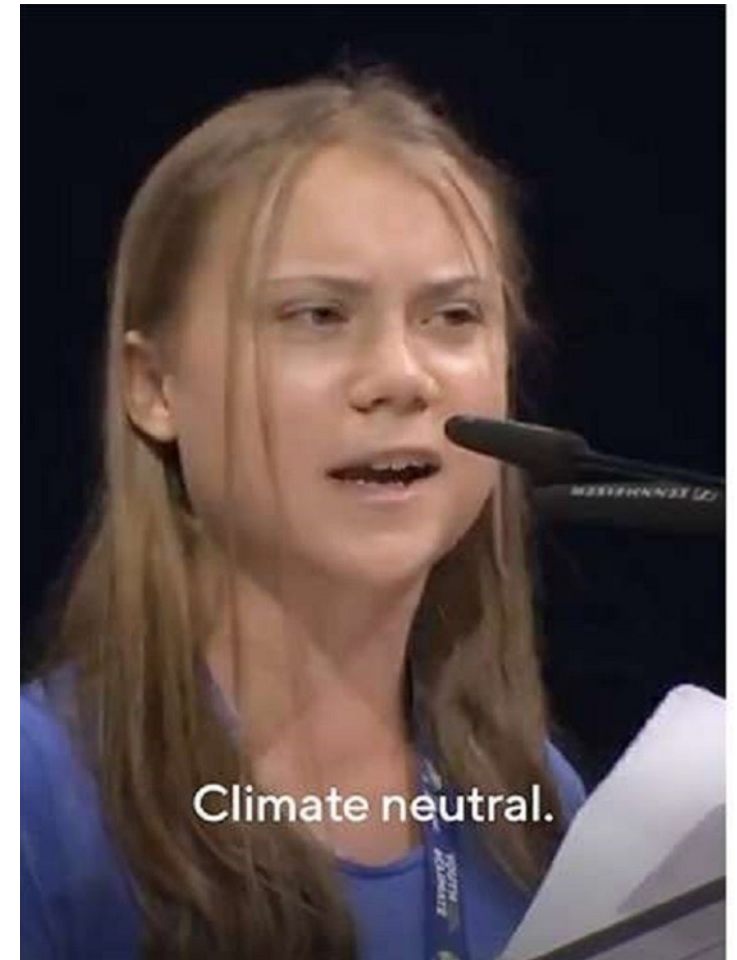
As in 2012



As in 2023

Climate change and energy transition

The Earth planet's temperature is continuously growing up (global warming), causing an increase in extreme weather events such as hurricanes, floods and fires. To stop this process, in November 2021 at COP26 in Glasgow, an international agreement confirmed the target of limiting this global warming to achieve carbon neutrality by 2050, including the intermediate target of an at least 55% net reduction in greenhouse gas emissions by 2030. Furthermore, it has been established thresholds of at least 32% of renewable energy and 32,5% for improvement in energy efficiency.

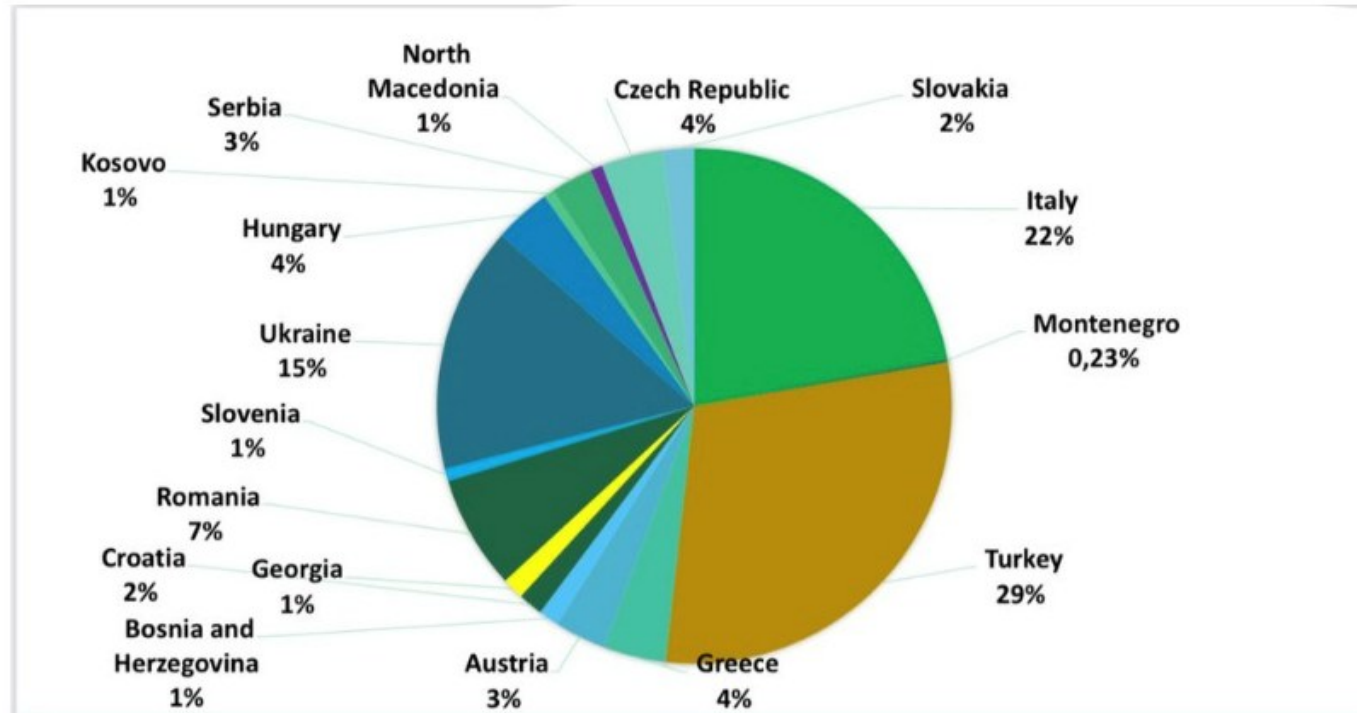


Reiceived 2024 Questionnaire Results

	<u>NC</u>	<u>Status</u>
1.	Austria	☐
2.	Bosnia and Herzegovina	☒
3.	Croatia	☒
4.	Czech R. /Slovakia	☐
5.	Georgia	☒
6.	Greece	☒
7.	Hungary	☐
8.	Israel	☒
9.	Italy	☒
10.	Kosovo	☒
11.	North Macedonia	☒
12.	Montenegro	☒
13.	Romania	☒
14.	Serbia	☒
15.	Slovenia	☒
16.	Turkey	☒
17.	Ukraine	☐

SEERC with Numbers

Population (280 Million)
(Population Including Israel)



<http://cigre-seerc.org/about-seerc/whatisseerc>

Climate change and energy transition

2030 climate and energy framework - existing ambition

Key targets for 2030:

- At least 40% cuts in **greenhouse gas emissions** (from 1990 levels)
- At least 32% share for [renewable energy](#)
- At least 32.5% improvement in [energy efficiency](#)
- The 40% greenhouse gas target is implemented by the [EU Emissions Trading System](#)

the [Effort Sharing Regulation](#) with Member States' emissions reduction targets and the [Land use, land use change and forestry Regulation](#)

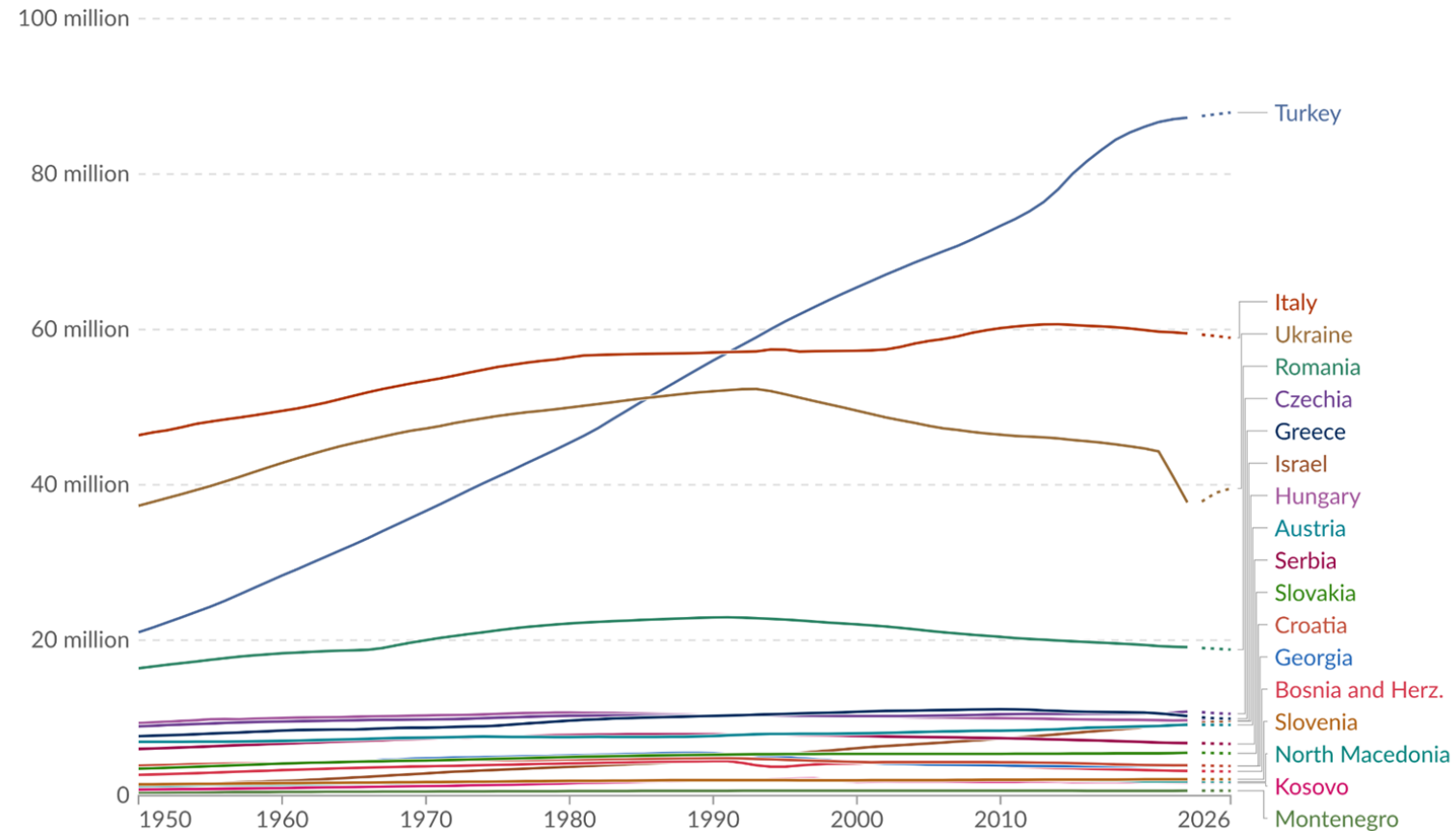
In this way, all sectors will contribute to the achievement of the 40% target by both reducing emissions and increasing removals.

All three pieces of climate legislation will now be updated with a view to implement the proposed at least 55% net greenhouse gas emissions reduction target.

General Outlook – Population 1950 to 2026 (WB data)

Population, 1950 to 2026

Future projections are based on the UN's medium scenario¹.



Data source: UN, World Population Prospects (2024)

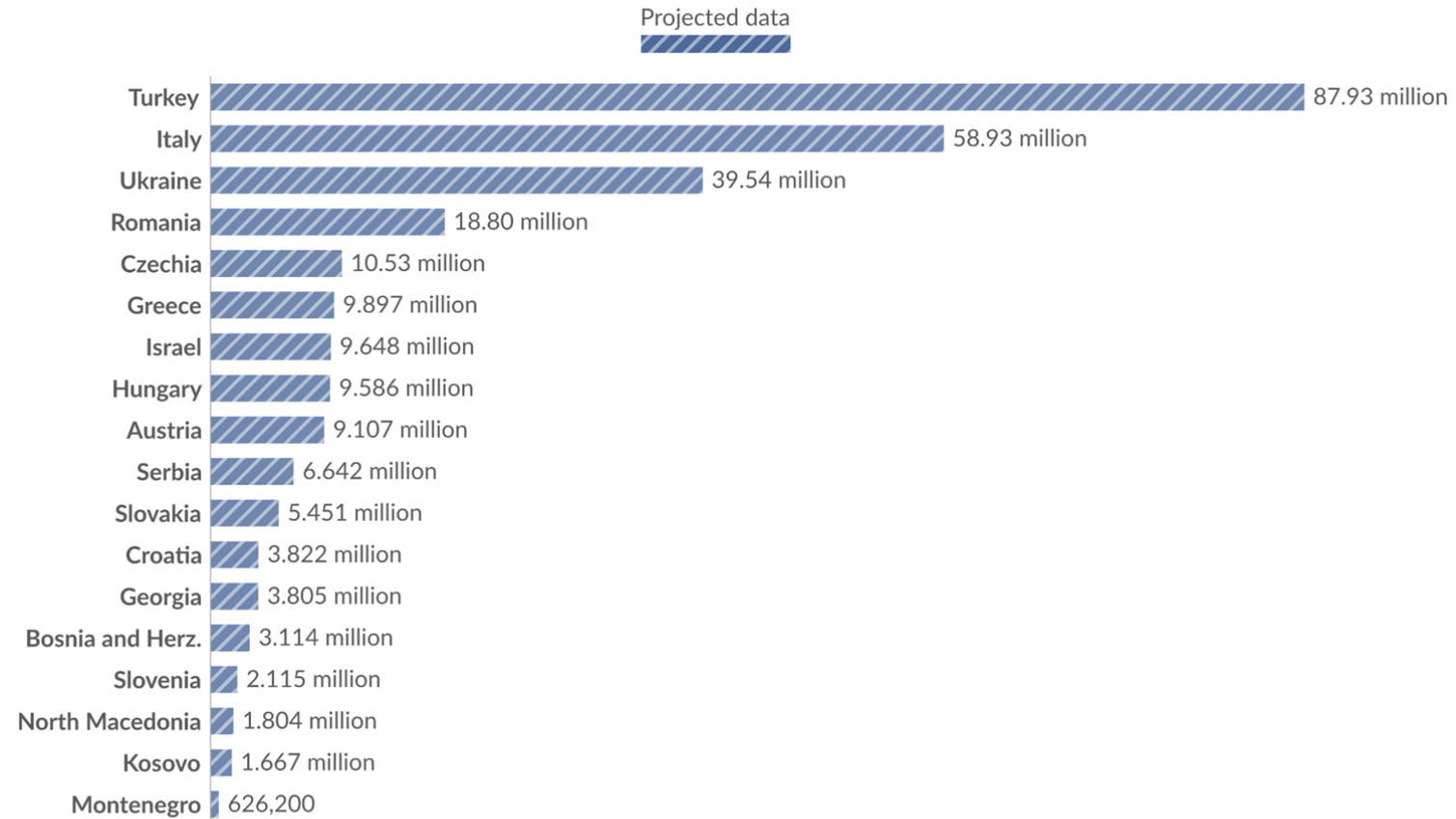
OurWorldinData.org/population-growth | CC BY

Population in 2026

Population, 2026



Future projections are based on the UN's medium scenario¹.

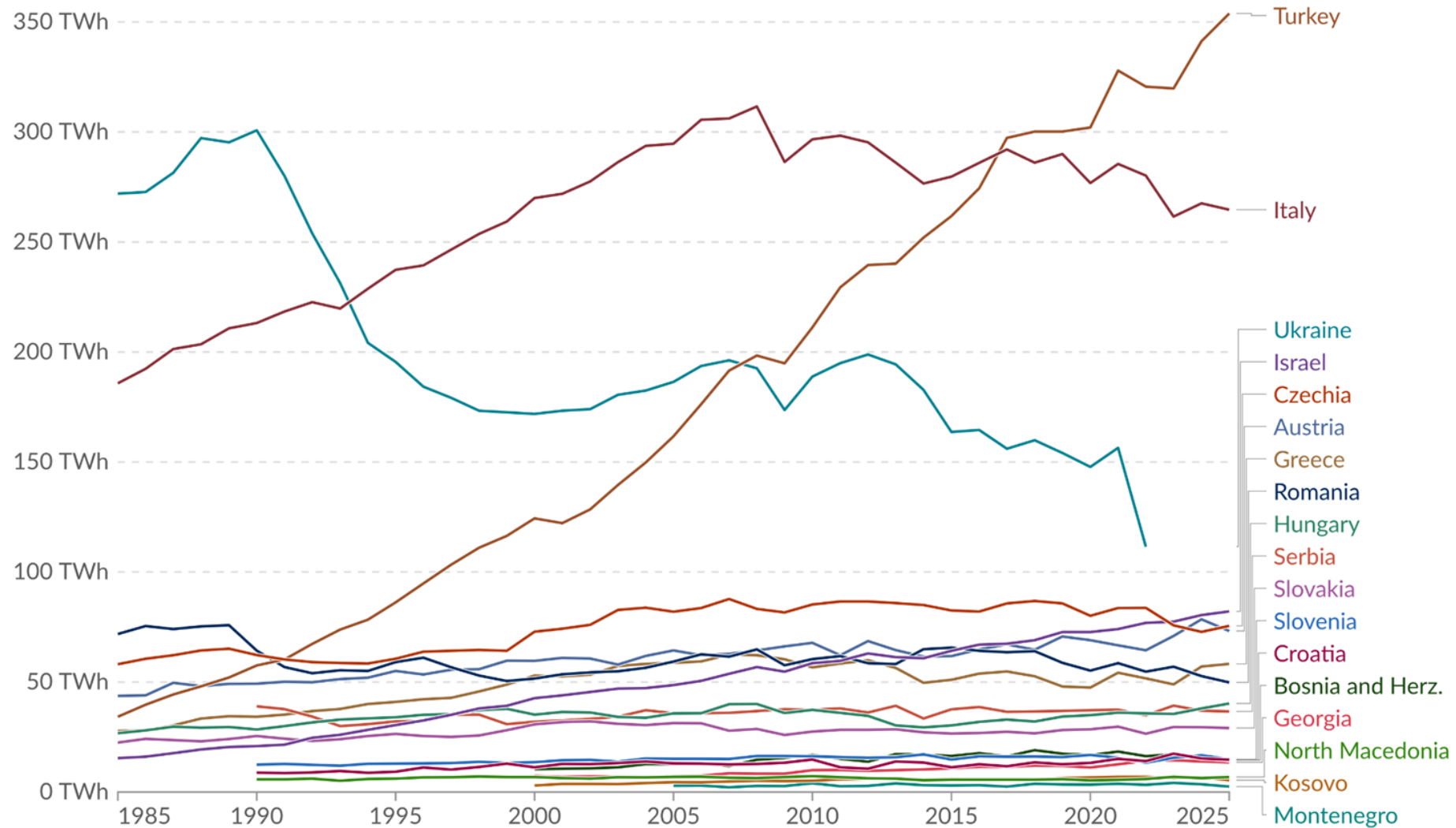


Data source: UN, World Population Prospects (2024)

OurWorldinData.org/population-growth | CC BY

Electricity generation

Total electricity generated in each country or region, measured in terawatt-hours¹.

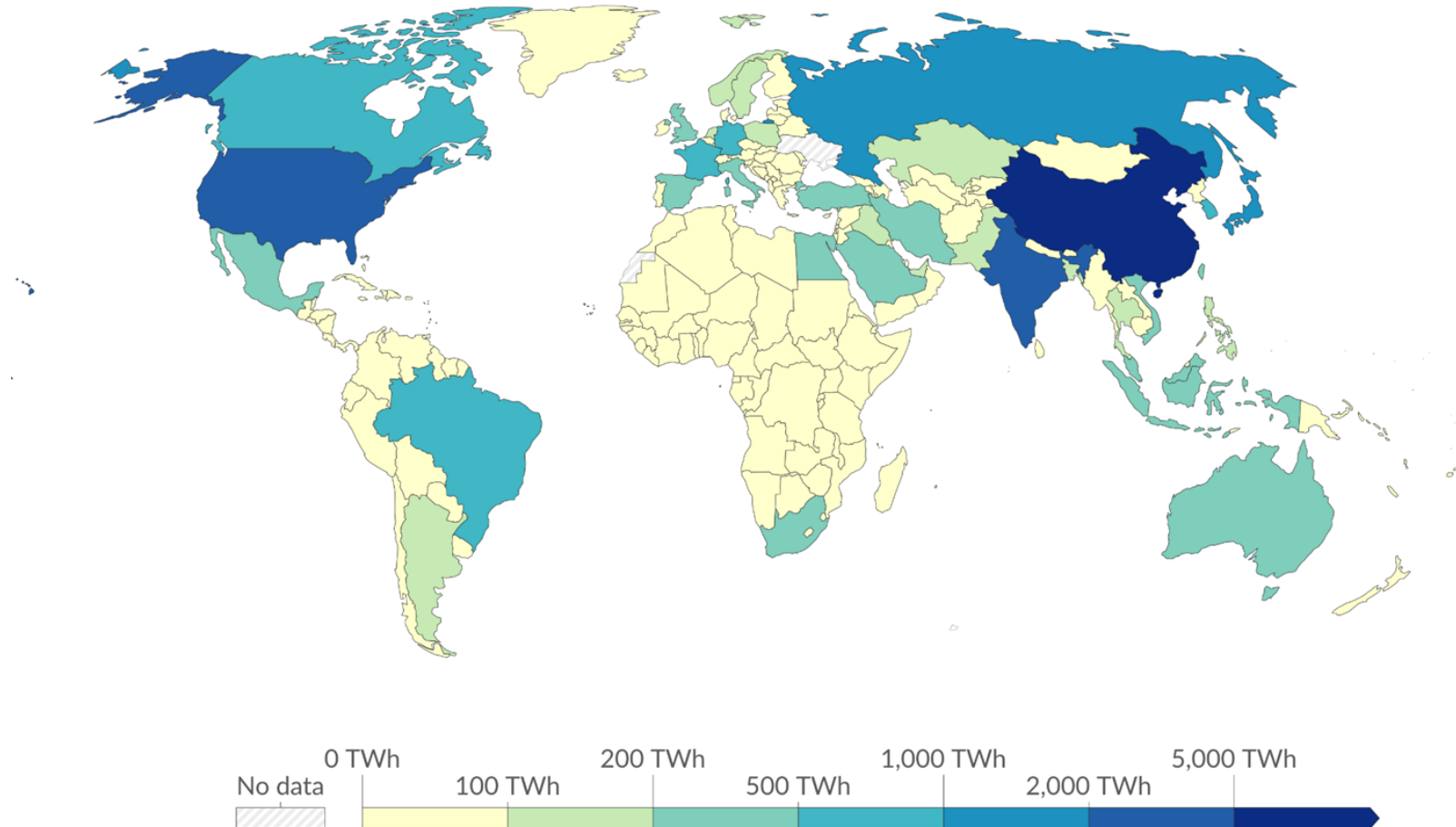


Data source: Ember (2026); Energy Institute - Statistical Review of World Energy (2025)

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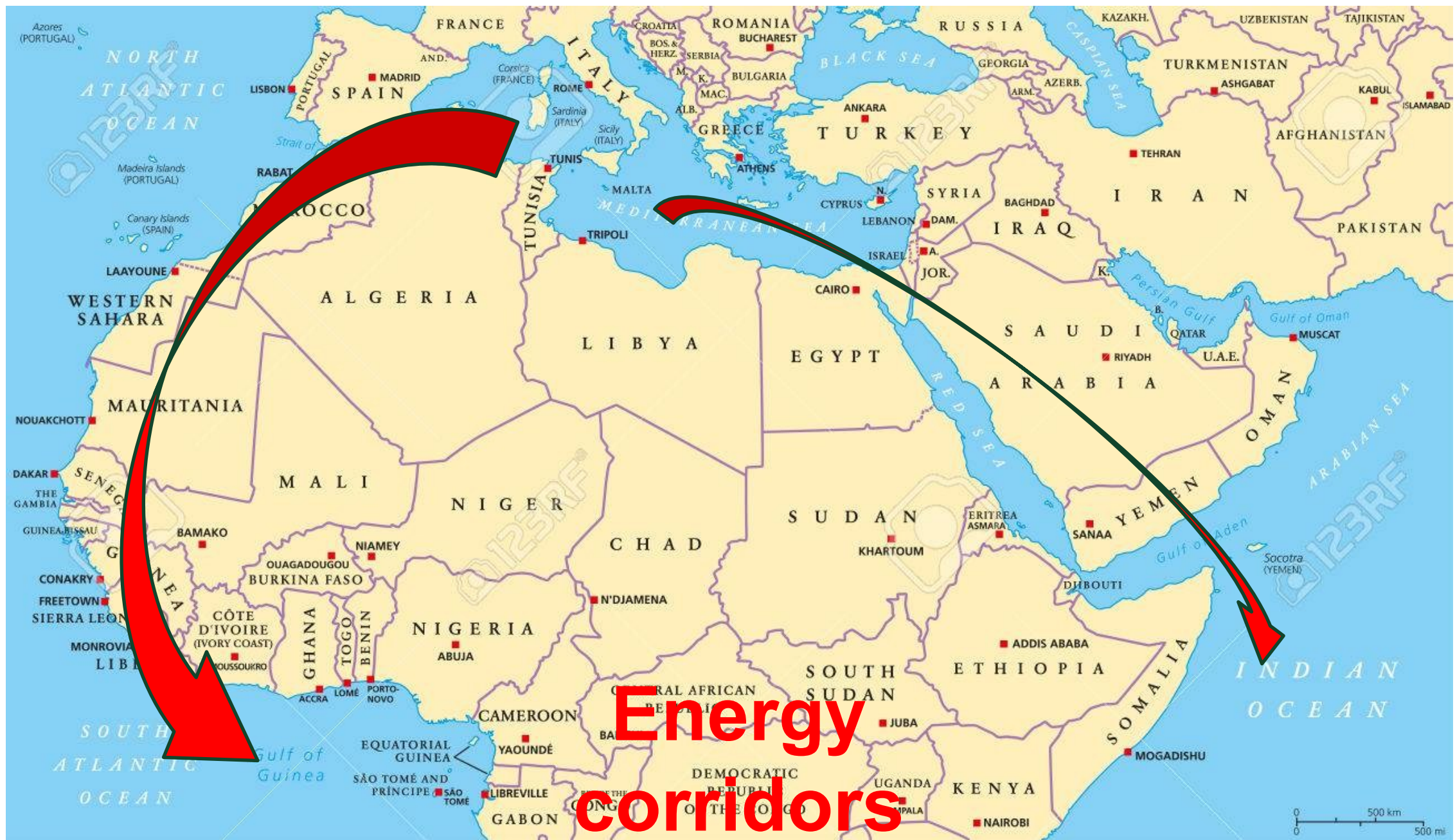
Electricity generation, 2025

Total electricity generated in each country or region, measured in terawatt-hours¹.



Data source: Ember (2026); Energy Institute - Statistical Review of World Energy (2025)

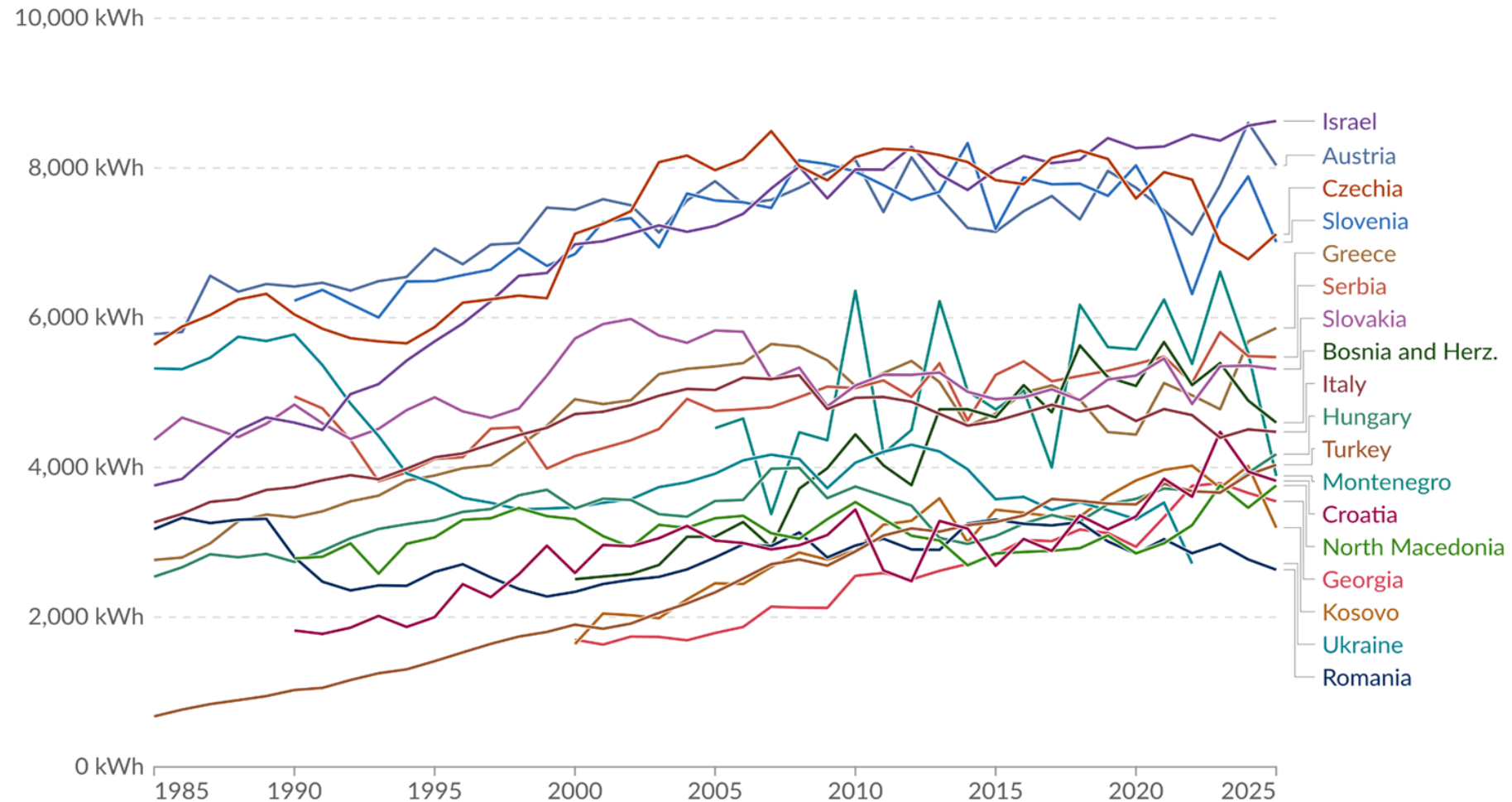
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Per capita electricity generation

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in Data

Annual average electricity generation per person, measured in kilowatt-hours¹.



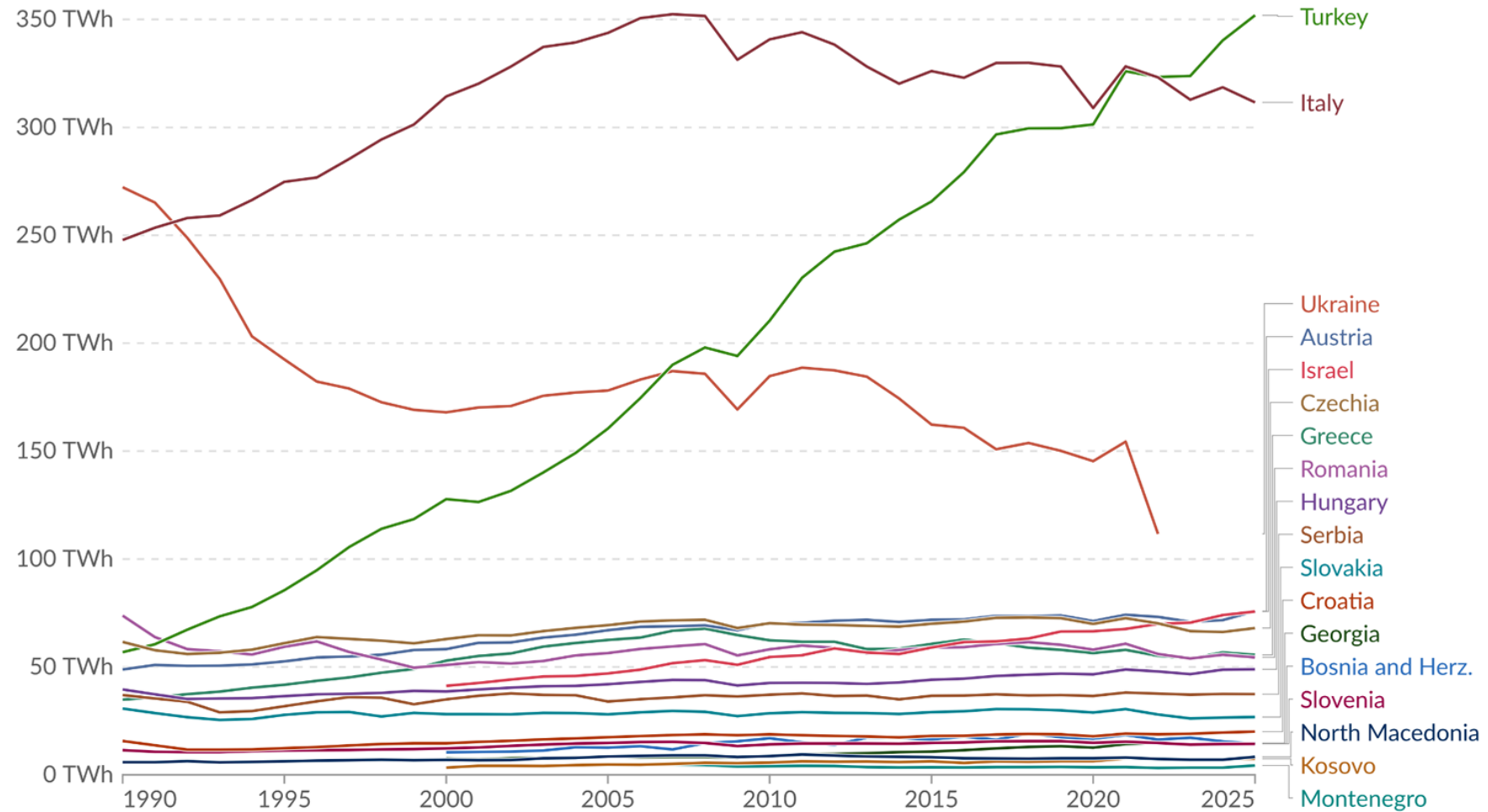
Data source: Ember (2026); Energy Institute - Statistical Review of World Energy (2025); Population based on various sources (2024)

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Electricity demand, 1990 to 2025

Our World
in Data

Electricity demand is measured in terawatt-hours¹, as total electricity generation, adjusted for electricity imports and exports.



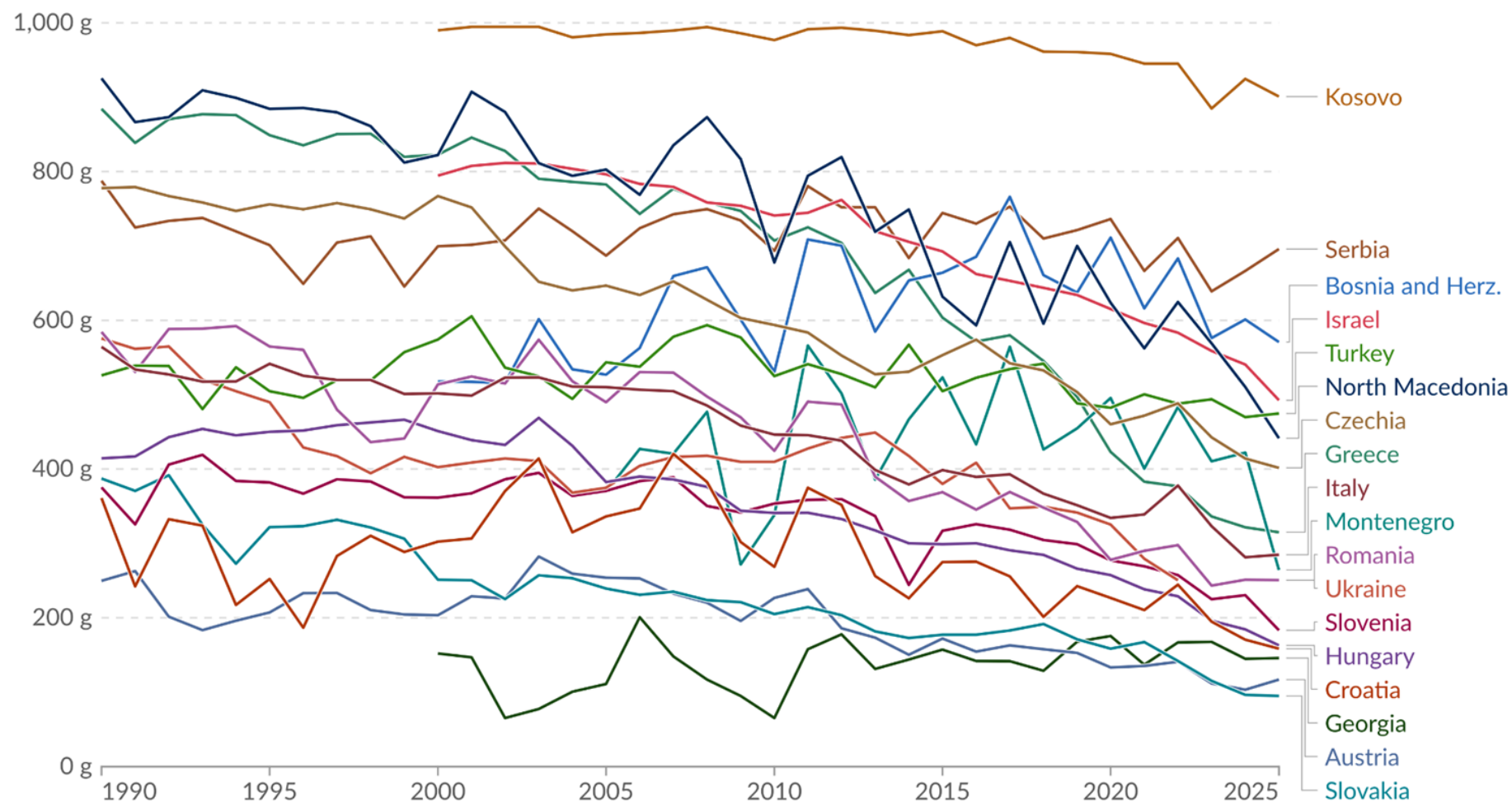
Data source: Ember (2026)

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Lifecycle carbon intensity of electricity, 1990 to 2025

Our World
in Data

Measured in grams of carbon dioxide-equivalents¹ emitted per kilowatt-hour² of electricity generated. Emissions are estimated on a lifecycle basis, including upstream, supply chain and manufacturing stages, and cover all greenhouse gases.

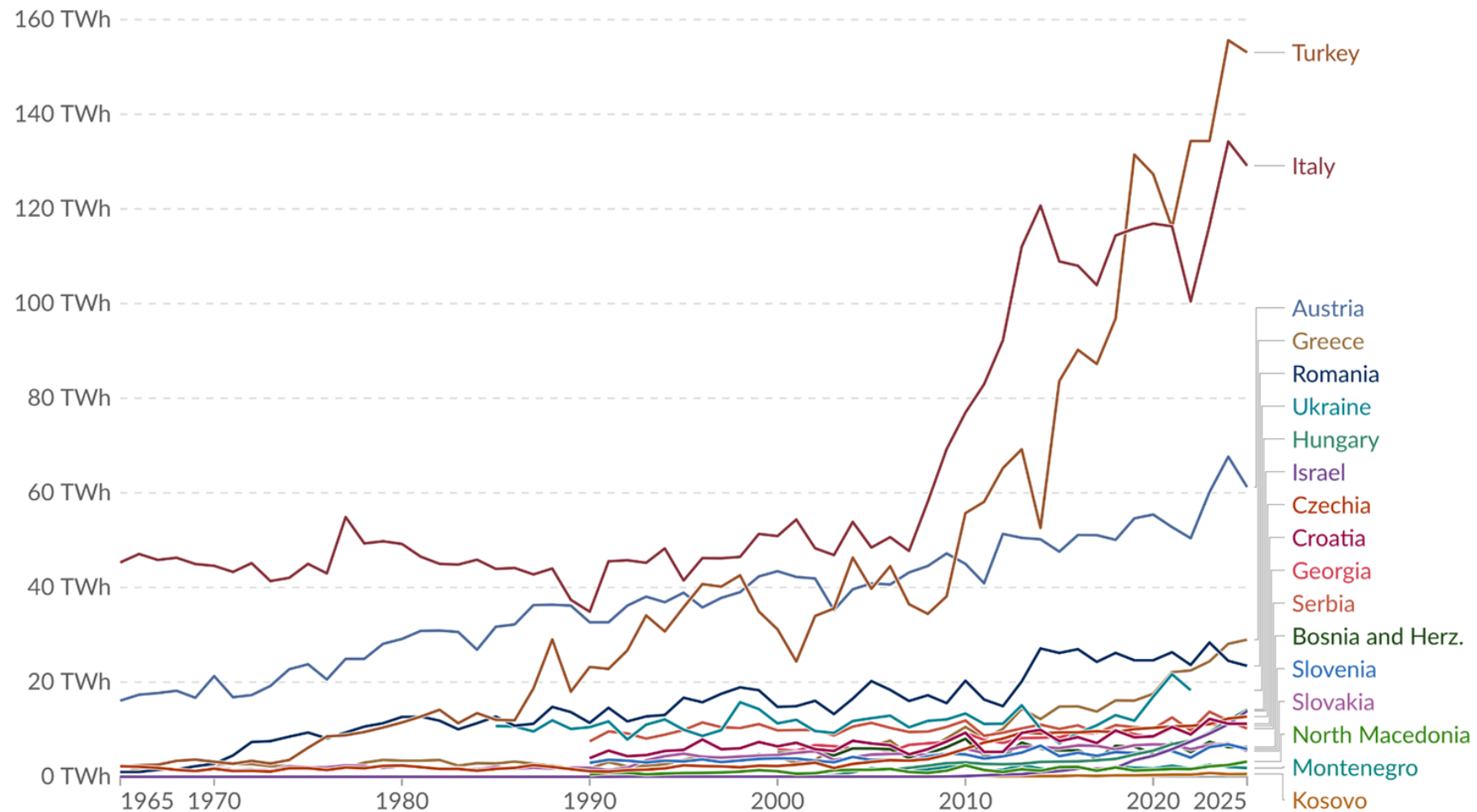


Data source: Ember (2026)

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Electricity generation from renewables

Measured in terawatt-hours¹. Renewable sources include solar, wind, hydropower, bioenergy, geothermal, wave, and tidal.

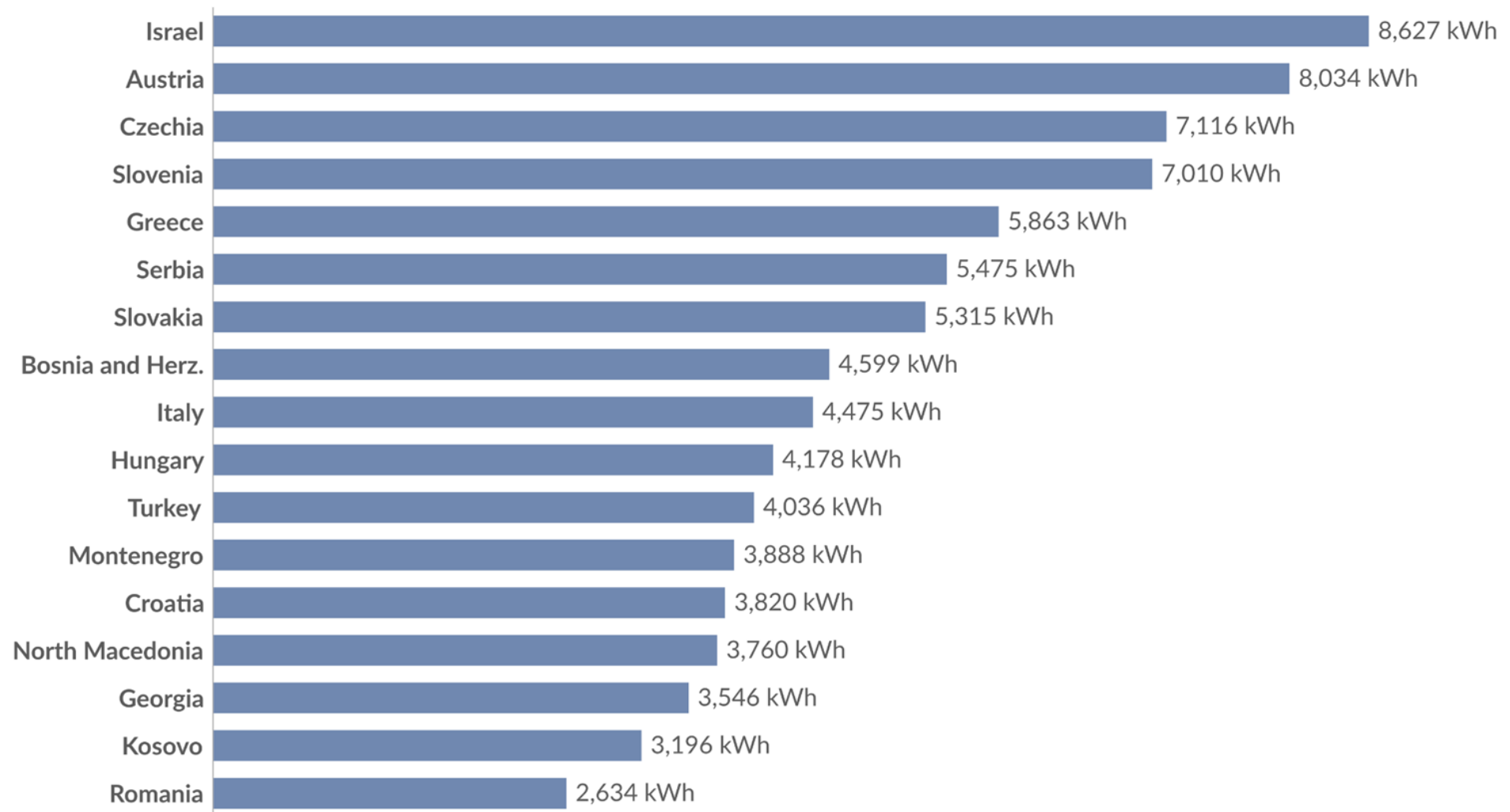


Data source: Ember (2026); Energy Institute - Statistical Review of World Energy (2025)

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Per capita electricity generation, 2025

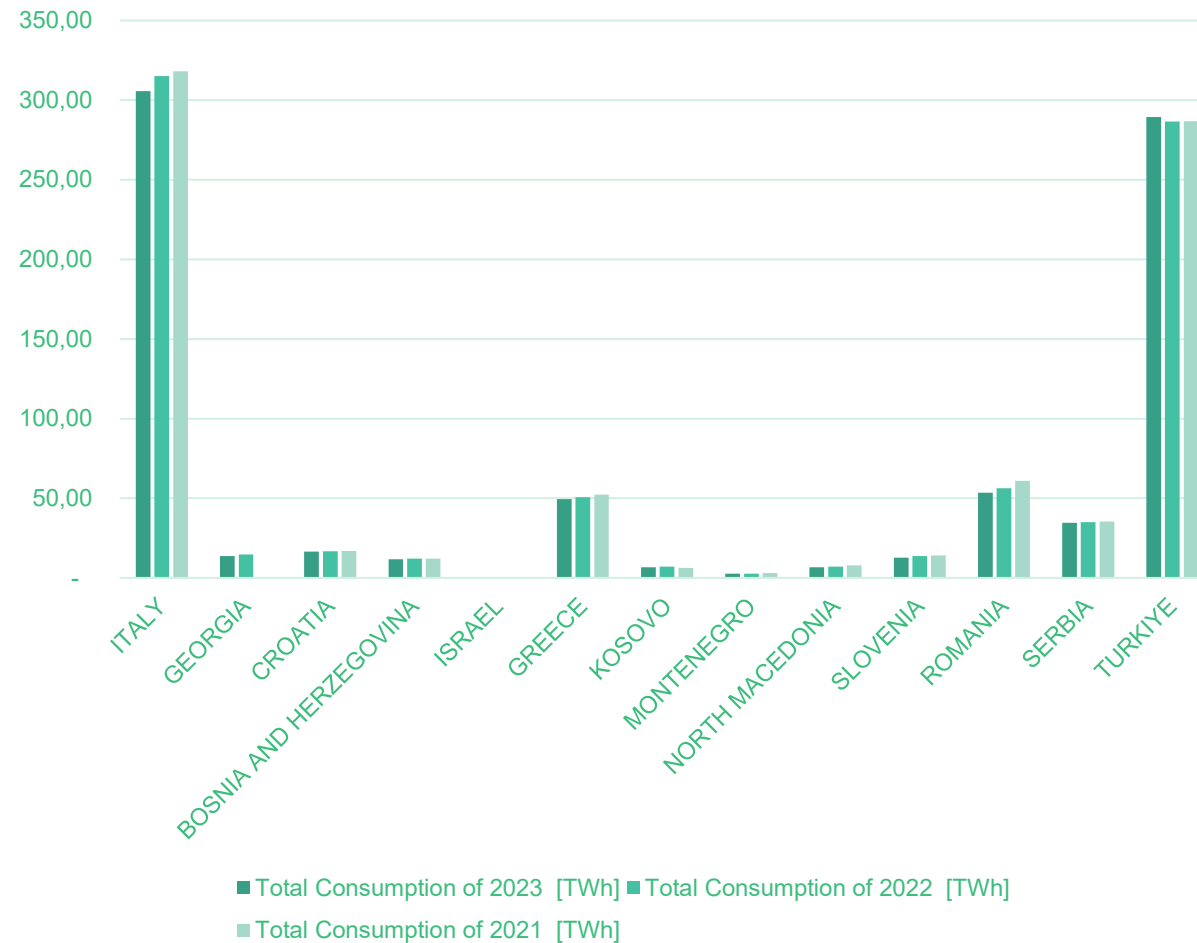
Annual average electricity generation per person, measured in kilowatt-hours¹.



Data source: Ember (2026); Energy Institute - Statistical Review of World Energy (2025); Population based on various sources (2024)

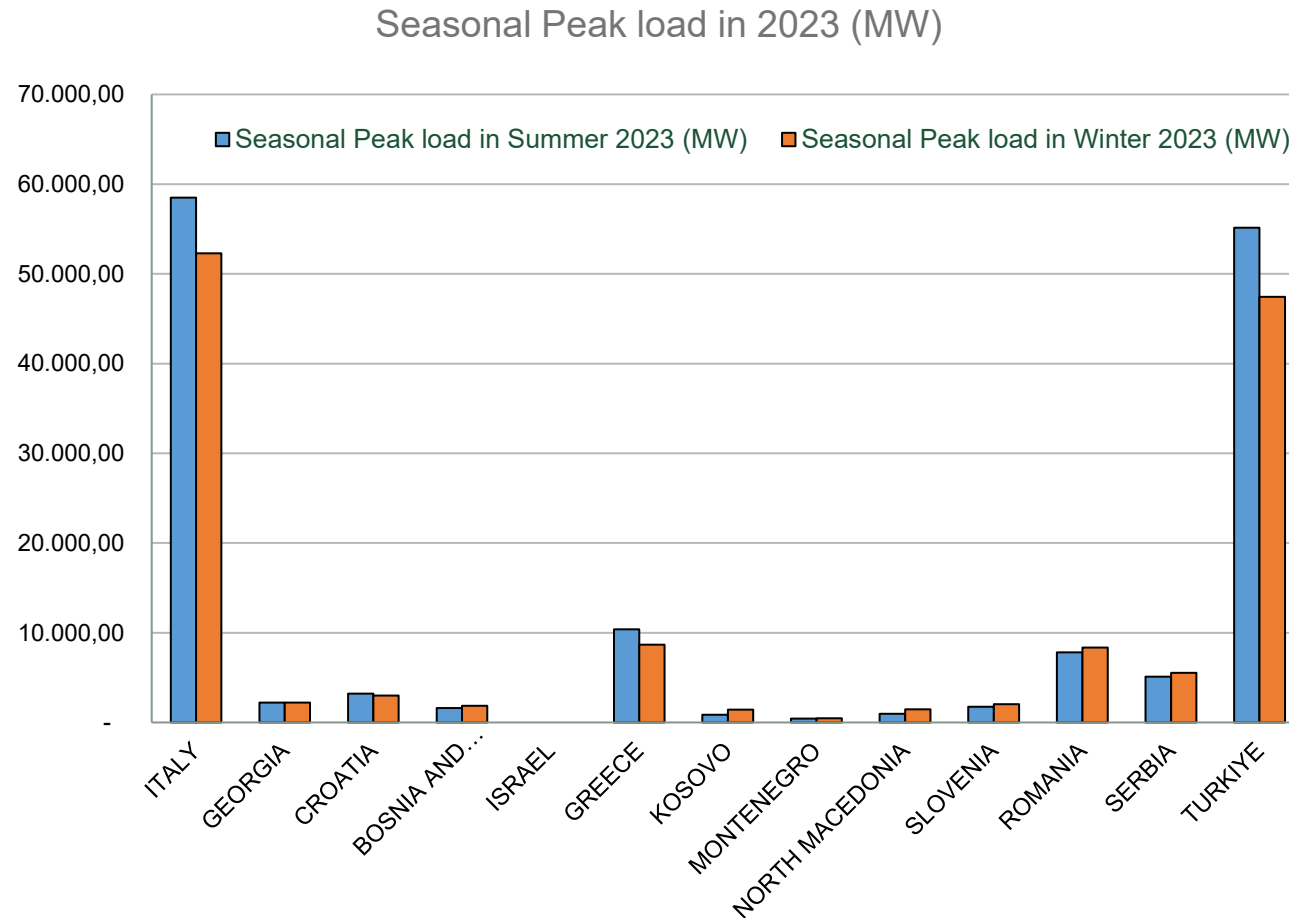
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Total Energy Consumption of the last three years (TWh)



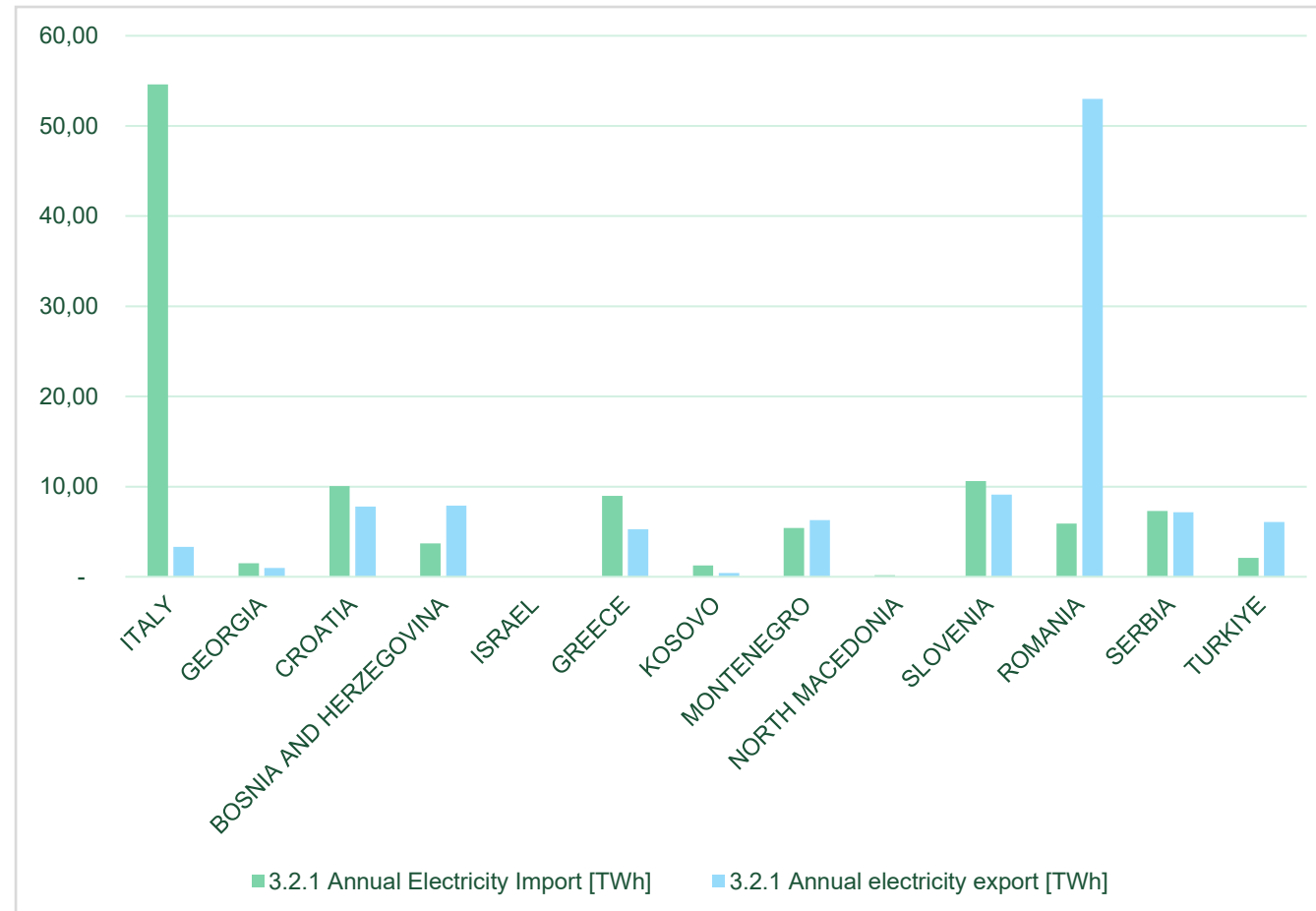
Energy Outlook - Seasonal Peak load in 2023 (MW)

Reference year 2023



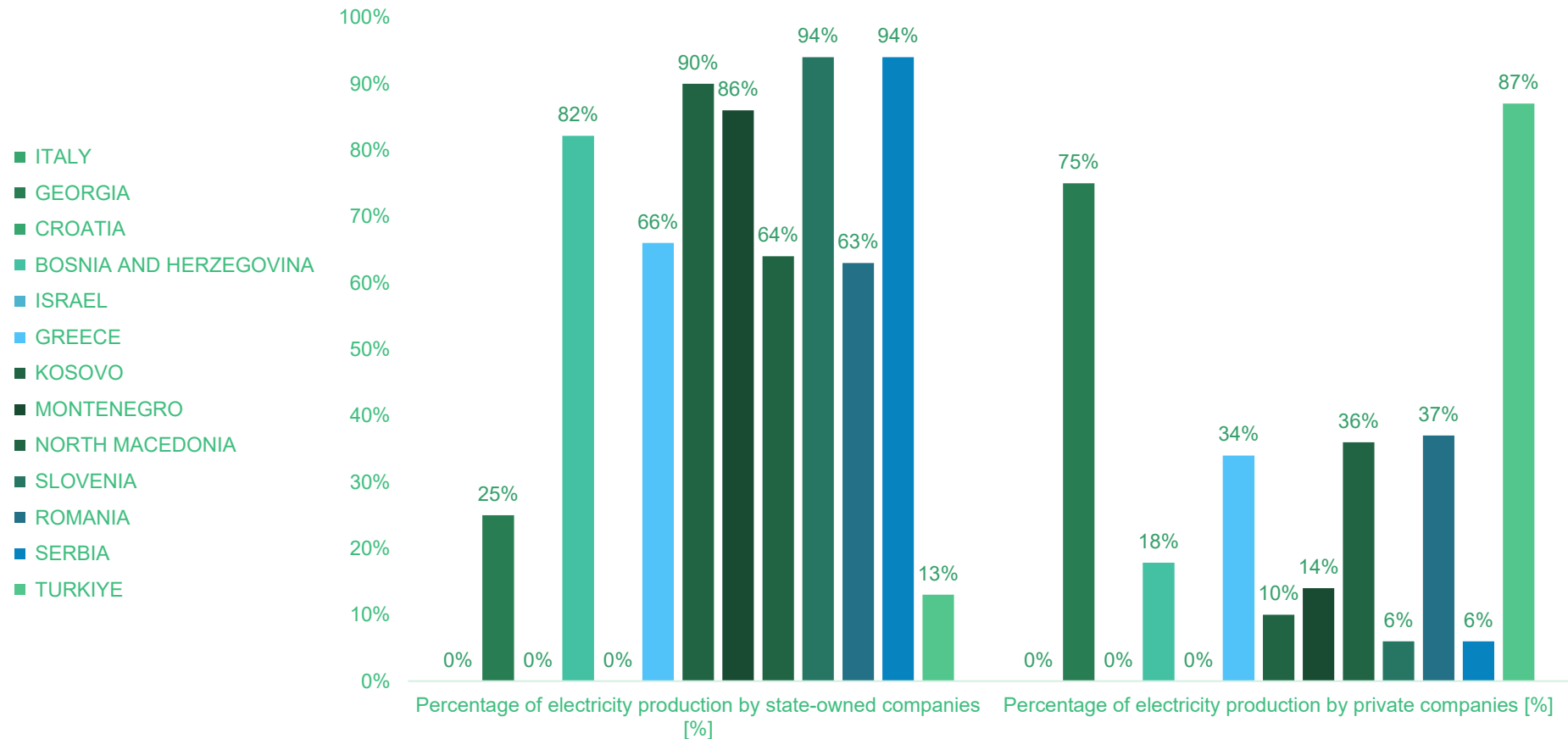
Annual Electricity import and export (TWh)

Reference year 2023



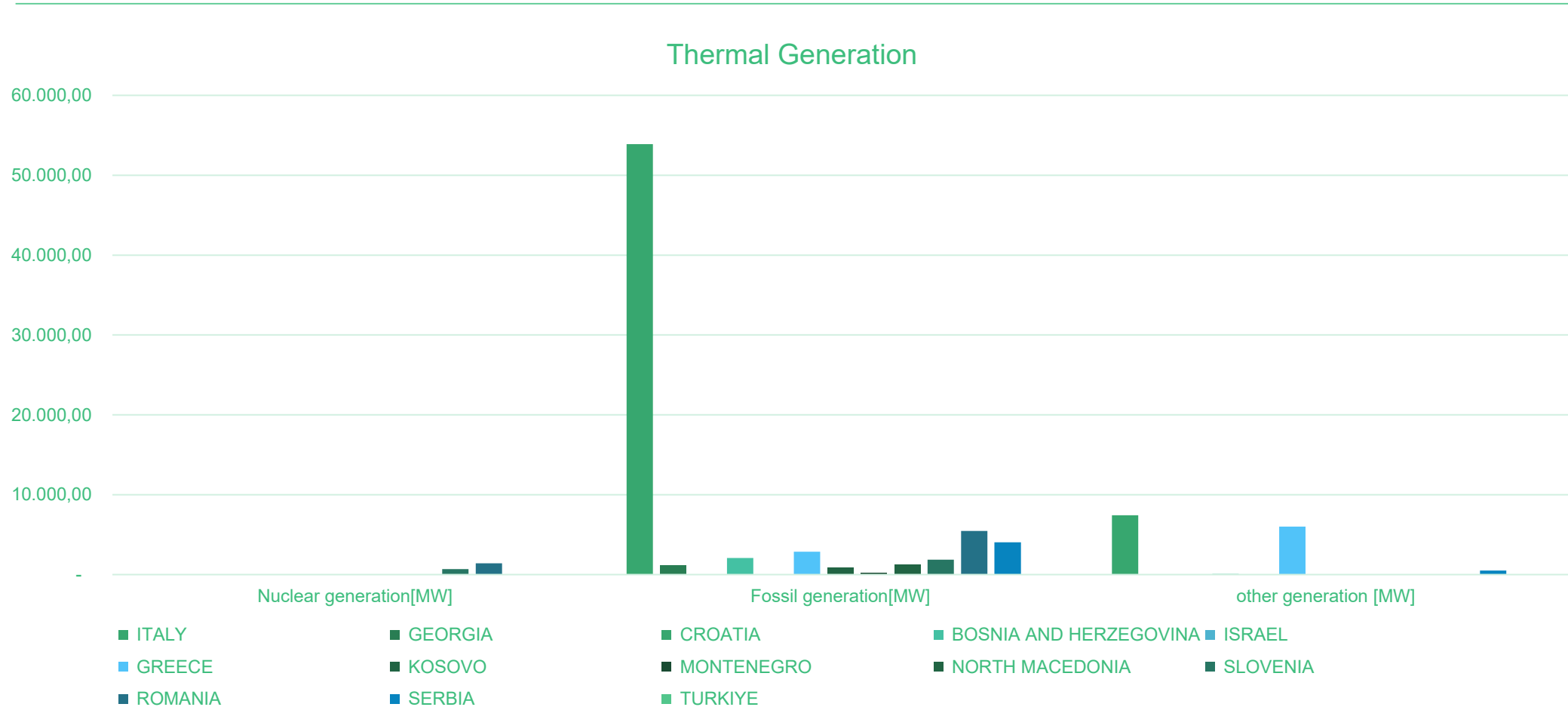
Percentage of electricity production by state-owned and by private companies

Reference year 2023



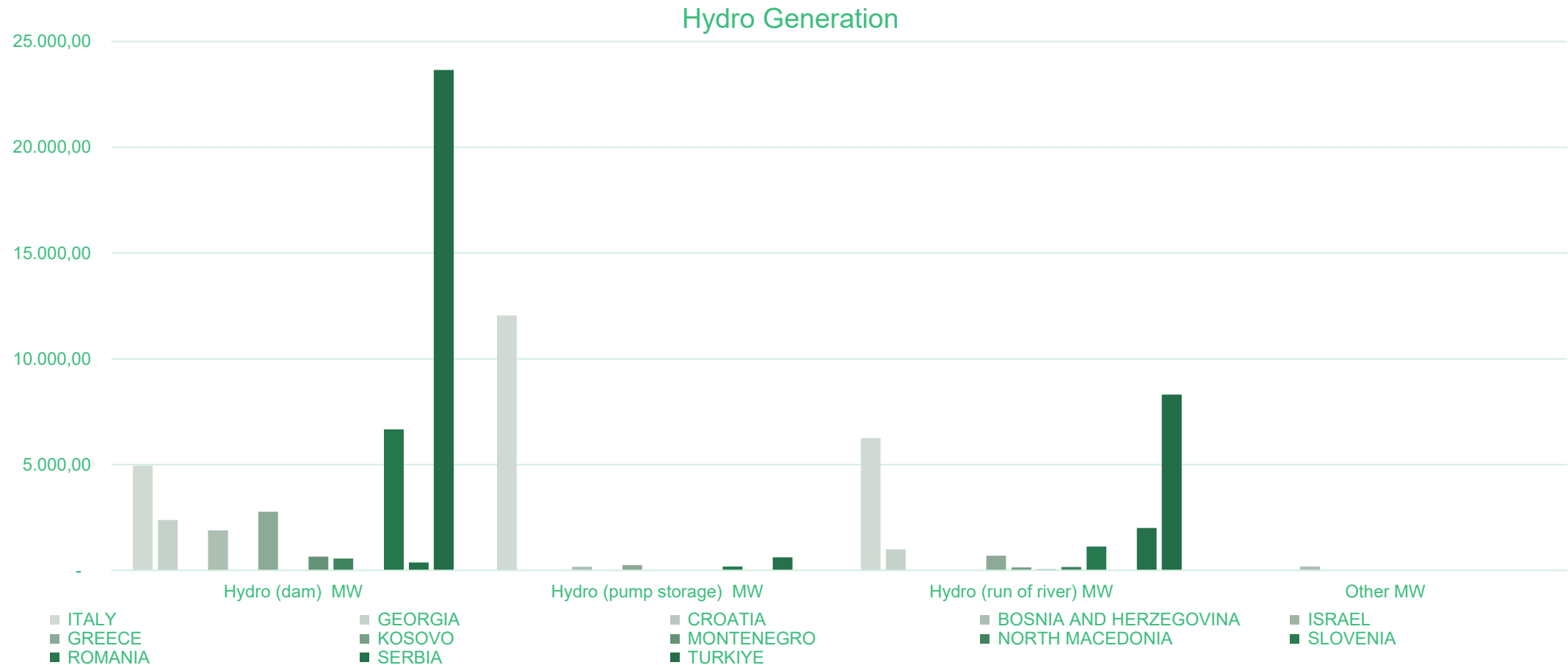
Thermal generation (MW)

Reference year 2023



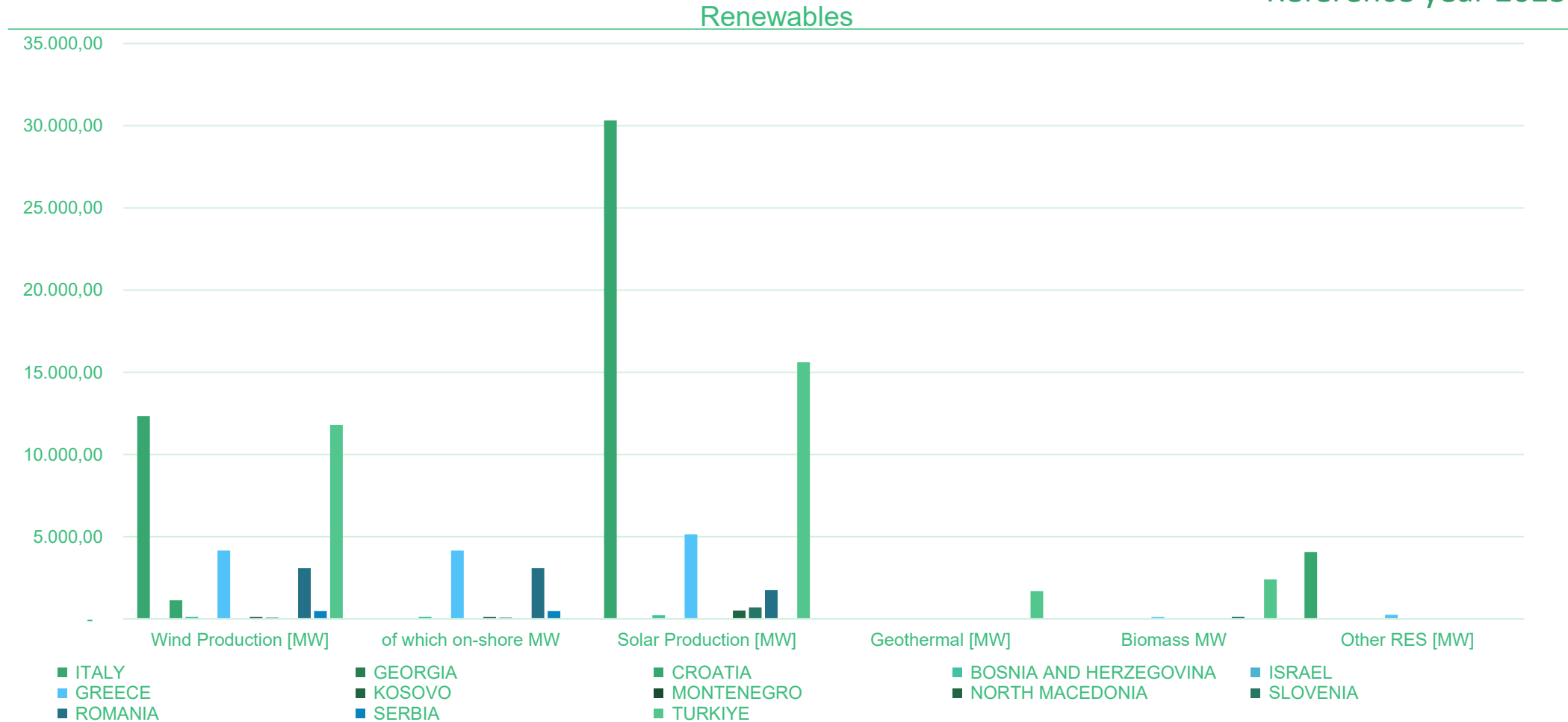
Hydro generation (MW)

Reference year 2023



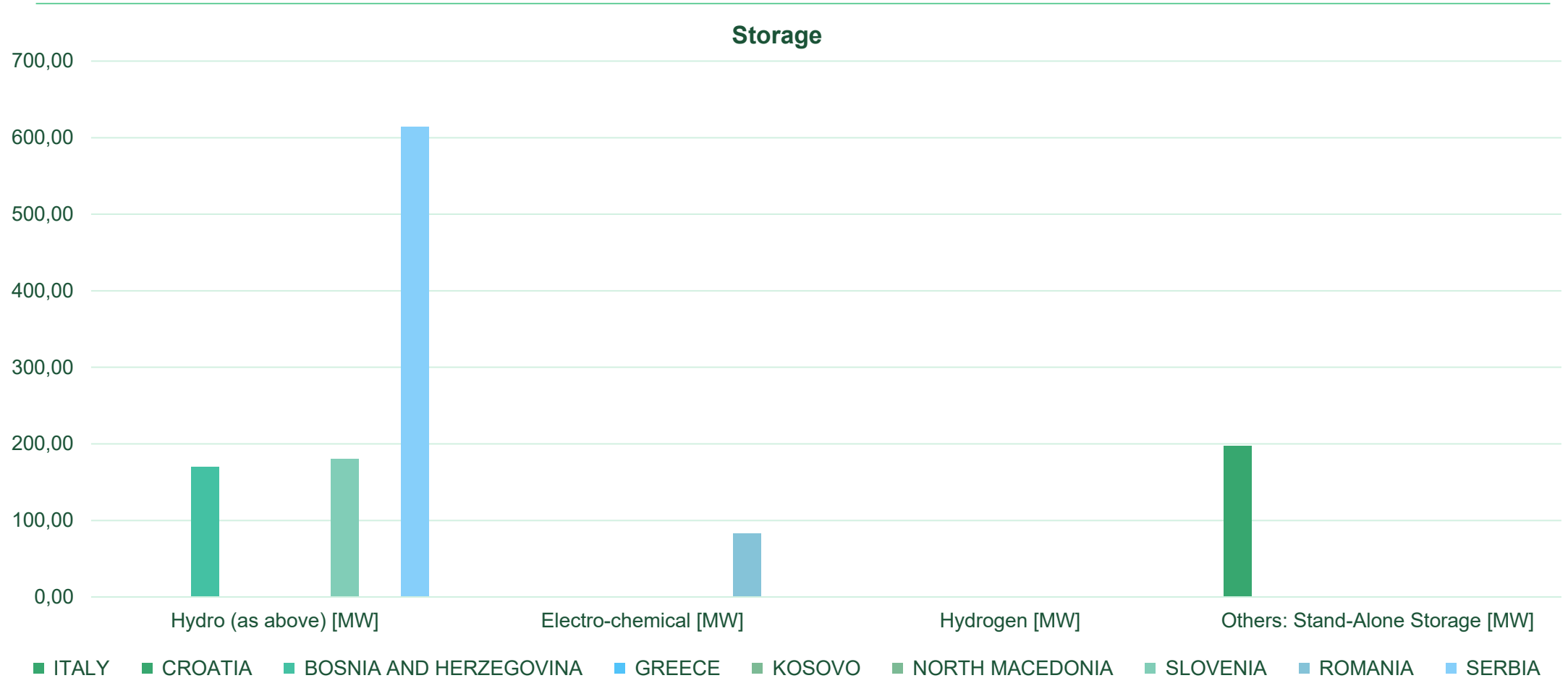
Renewables

Reference year 2023



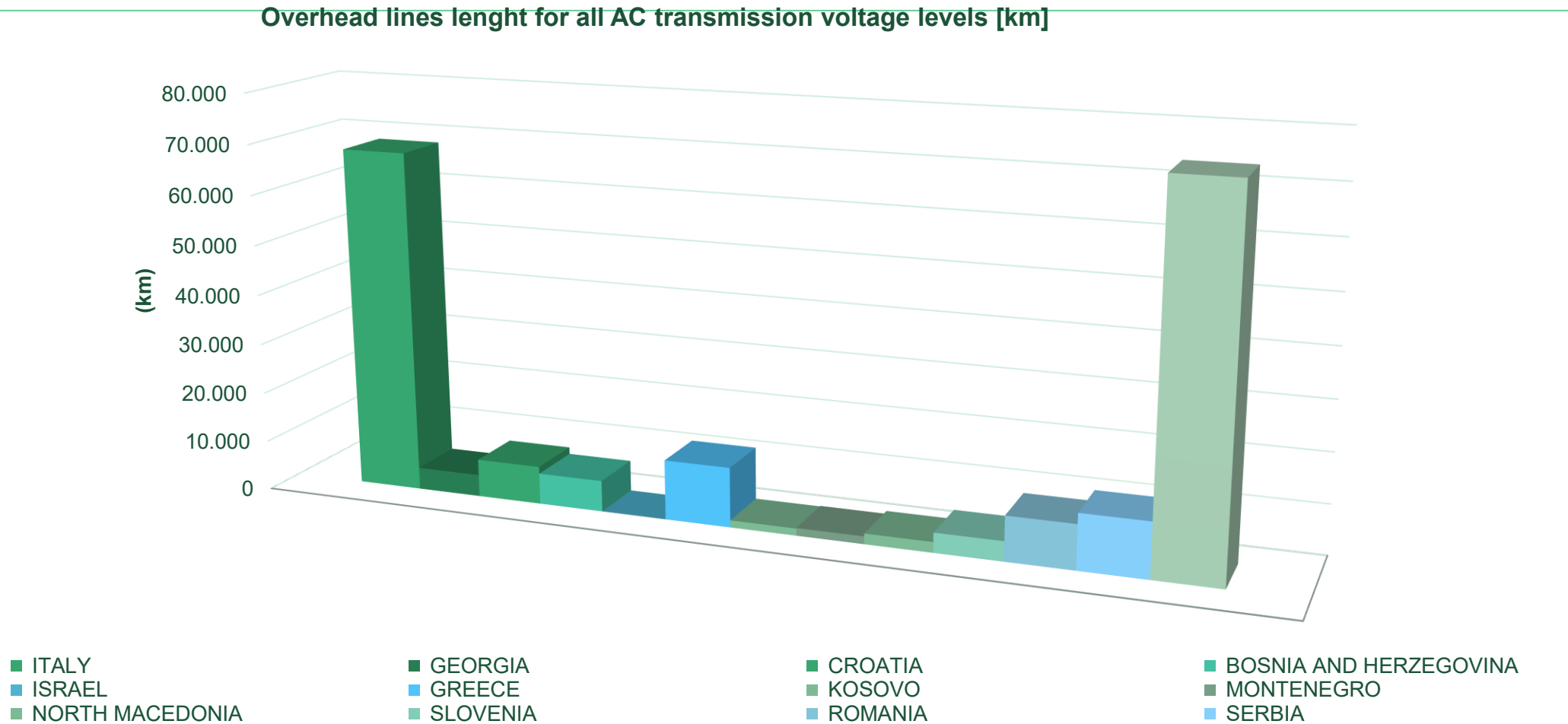
Storage

Reference year 2023



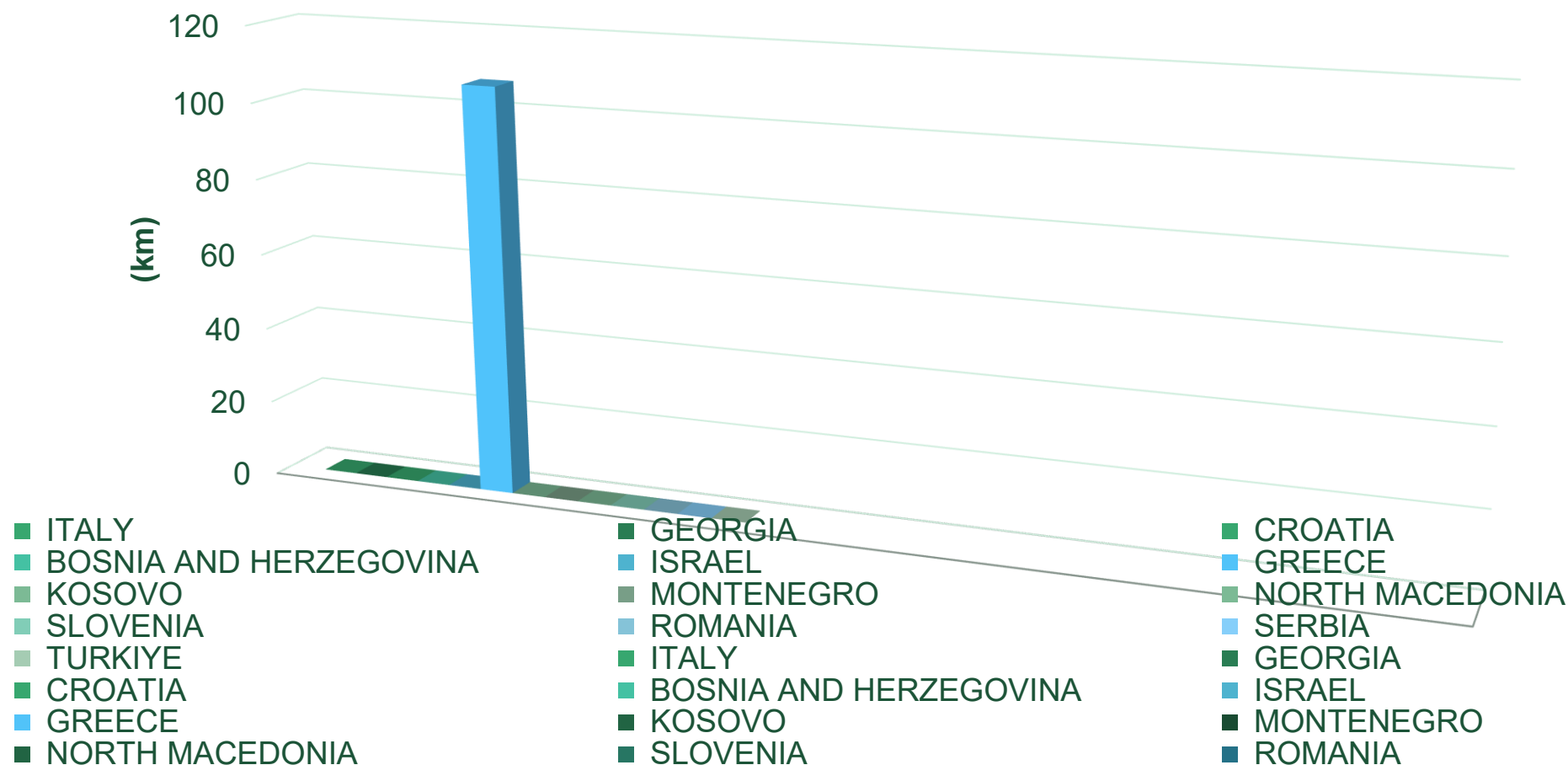
Transmission Network (30-750 kV)

Overhead lines lenght for all AC transmission voltage levels [km]



Transmission Network (30-750 kV)

Overhead lines lenght for all DC transmission voltage levels [km]



3D bar chart showing the number of countries in the Balkan region with a distance of 100 km or more from the Black Sea. The Y-axis represents the number of countries (km), ranging from 0 to 1,400,000. The X-axis lists countries: GEORGIA, GREECE, SLOVENIA, ITALY, ISRAEL, NORTH MACEDONIA, TURKIYE, CZECH REPUBLIC, CROATIA, KOSOVO, ROMANIA, SERBIA, BOSNIA AND HERZEGOVINA, MONTENEGRO, CROATIA, KOSOVO, ROMANIA, AUSTRIA, and UKRAINE. The bars show varying distances, with some countries having significantly higher values than others.

Questionnaire

What technical field of electric power engineering do you prefer for a regional CIGRE cooperation?

QUESTIONNAIRE													
Questions	Italy	Georgia	Croatia	Bosnia and Herzegovina	Israel	Greece	Kosovo	Montenegro	North Macedonia	Slovenia	Romania	Serbia	Turkey
Elements of electric power system (Generators/motors, Transformers, HV-MV-LV equipment, Materials)	no	no	no	no	no	no	yes	no	yes	no	yes	no	no
Sub-systems (cables, OHLs, Substations, Protection/automation, HVDC and power electronics, HVAC, Power plant performances, DC distribution, DTR systems, sensors)	yes	yes	yes	no	yes	no	no	no	no	yes	yes	no	yes
Systems and Interconnection (Development, Operation, Control, Planning approaches, Tools, Dynamics, Regional Trainings, Regional Market design, Regulation of system, Regional Power Exchange, Cooperation)	yes	yes	no	yes	no	yes	yes	yes	yes	no	no	yes	yes
Security of electricity supply, System adequacy, Stability issues	yes	yes	no	yes	no	no	yes	no	no	no	yes	yes	yes
Power system resilience (Cyber Security, Damage preventing, System Recovery, Survivability)	yes	yes	yes	yes	no	no	yes	no	yes	yes	yes	no	yes
Environment, decarbonization and transition of power system	yes	no	no	yes	yes	yes	no	no	yes	yes	yes	no	yes
Power system economics and social implications	yes	no	no	yes	no	no	no	no	no	no	no	no	yes
Renewables, Smart Grids (strategic views, observability/TSO-DSO interoperability, ancillary services/flexibility/aggregation, Electrical Vehicles issue, power-2-gas, DSM, DR, energy efficiency etc.)	yes	yes	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes
Institutional arrangements, legal issues, standardization supports	no	no	yes	no	no	no	no	no	no	yes	no	no	no
Information and telecommunication technologies in Power sector, smart utilities, digitalization of system	no	no	yes	yes	no	yes	no	no	no	no	no	no	no
Distribution system challenges, Smart Houses, Micro Grids, Smart local communities	no	no	no	yes	no	yes	no	no	yes	no	no	yes	no
Technological innovation in power sector	no	no	no	yes	no	no	no	no	no	yes	yes	no	no

Questionnaire

What are the technical areas which you would like to contribute to, generally?

QUESTIONNAIRE

Questions	Italy	Georgia	Croatia	Bosnia and Herzegovina	Israel	Greece	Kosovo	Montenegro	North Macedonia	Slovenia	Romania	Serbia	Turkey
A1 - Power generation and electromechanical energy conversion	yes	no	no	no	no	no	no	no	no	no	no	no	no
A2 - Power transformers and reactors	no	no	no	no	no	no	yes	no	yes	no	no	no	no
A3- Transmission and distribution equipment	no	no	no	no	no	no	no	no	no	no	no	no	no
B1 - Insulated cables	yes	no	no	no	yes	yes	no	no	yes	no	no	no	no
B2 - Overhead lines	yes	no	yes	no	yes	no	no	no	yes	yes	yes	no	no
B3 - Substations and electrical installations	no	no	no	no	no	no	no	no	no	yes	yes	no	no
B4 - DC Systems and power electronics	yes	no	no	no	no	no	no	no	no	no	no	no	yes
B5 - Protection and Automation	no	no	no	no	no	no	no	no	no	no	yes	no	no
C1- Power system development and economics	yes	yes	yes	yes	no	yes	yes	no	yes	yes	no	no	yes
C2 - Power system Operation and Control	no	yes	no	yes	no	yes	yes	no	yes	no	no	yes	yes
C3 - Power system sustainability and environmental performance	yes	no	yes	yes	yes	no	no	no	no	no	yes	no	no
C4 - Power system technical performance	yes	yes	yes	no	no	no	no	no	yes	no	no	no	no
C5 - Electricity markets and regulation	yes	no	no	no	no	yes	no	yes	yes	no	no	yes	yes
C6 - Active distribution systems and distributed energy resources	yes	no	no	no	no	yes	yes	no	yes	no	no	no	no
D1 - Materials and emerging test techniques	no	no	no	no	no	no	no	no	no	no	no	no	no
D2 - Information systems and telecommunication and cybersecurity	no	no	no	no	no	no	no	no	no	no	no	no	no

Thanks for your attention!
