

IRENA FlexTool

**TRAINING FOR EASTERN
EUROPE AND CENTRAL ASIA**

**SESSION 2: The importance of a power
system flexibility assessment – REmap
CESEC**



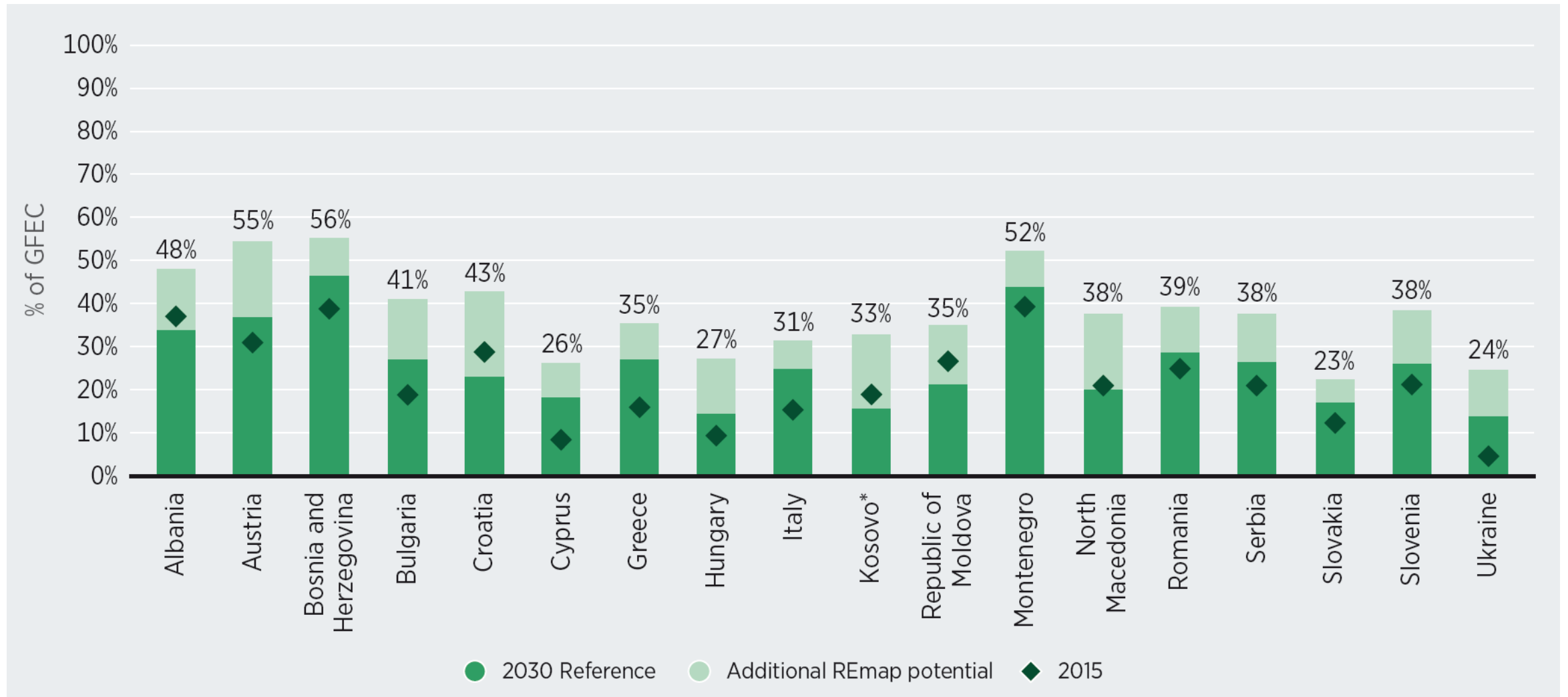


- Analyses cost-effective potential for renewables in the region by 2030.
- Impact on energy costs, investments, security of supply, GHG emissions, environmental and health externalities.
- Full energy system perspective.

Geographical coverage



All CESEC members have additional cost-effective potential beyond existing plans / projections.



Renewables improve energy security while aligning the region with the goals of the Paris Agreement



18%

Natural Gas Demand Reduction

Compared to the Reference scenario to 2030.

Comparable to today's total primary demand for natural gas in Ukraine.



14%

Oil Demand Reduction

Compared to the Reference scenario to 2030.

Comparable to today's total oil consumption of Croatia and Greece combined.



21%

CO₂ Emissions Reduction

Compared to the Reference scenario to 2030.

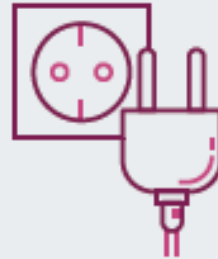
Comparable to today's total emissions of Romania and Bulgaria combined.

Key renewable energy options for CESEC members until 2030



Deployment of renewable power generation

- Large potential of > 1300 GW combining wind, solar, bio and hydro.
- Cost reductions of 82% and 39% for solar PV and wind since 2010.
- Cheaper than fossil and nuclear generation in most markets worldwide.
- Cost reductions expected to continue.



Electrification of heat and transport services

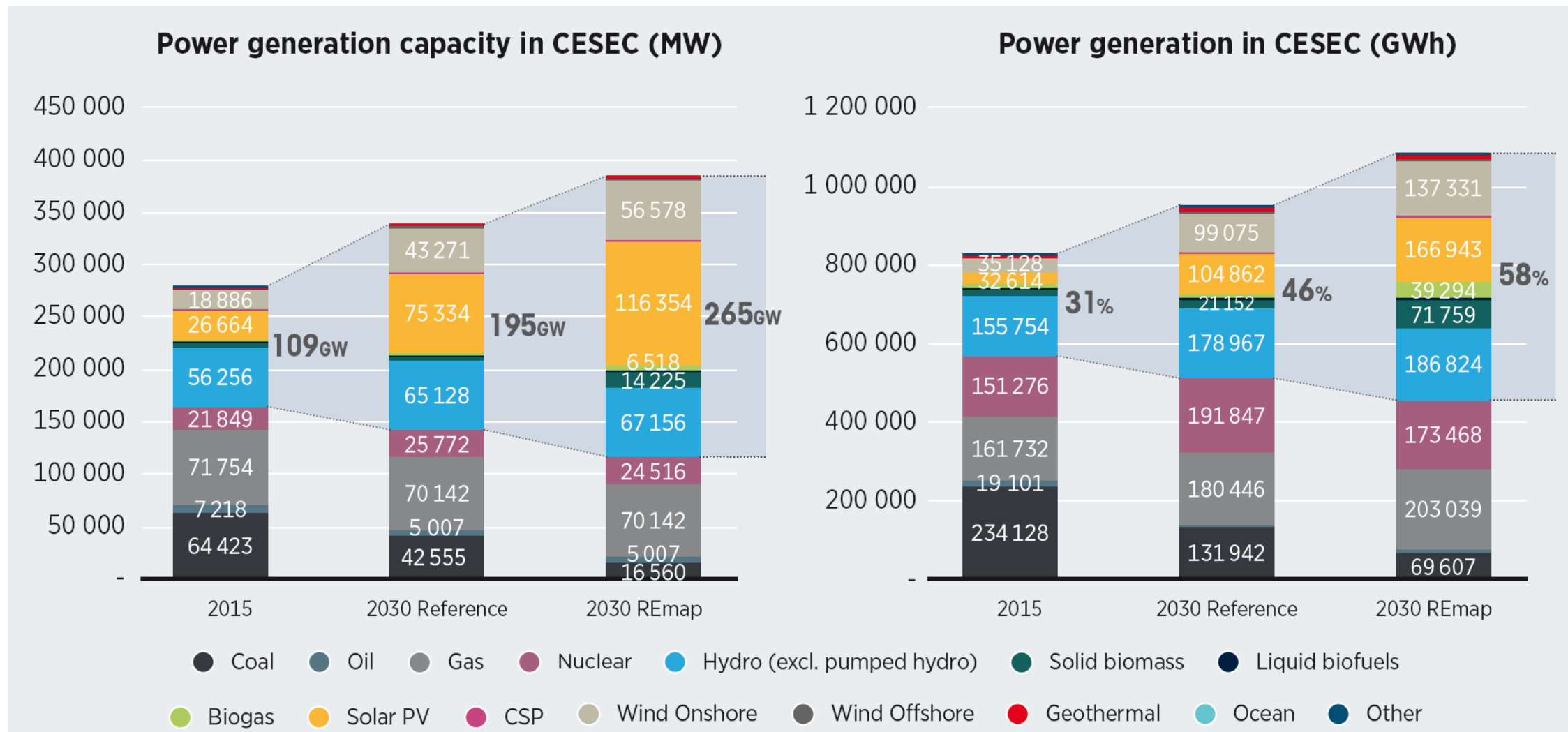
- Large associated efficiency gains (3-4 times less energy use).
- Power, easier to decarbonize than fuels.
- Elimination of local air pollution.
- Asset for integration of more renewables in the power sector.



Scale - up sustainable bioenergy use

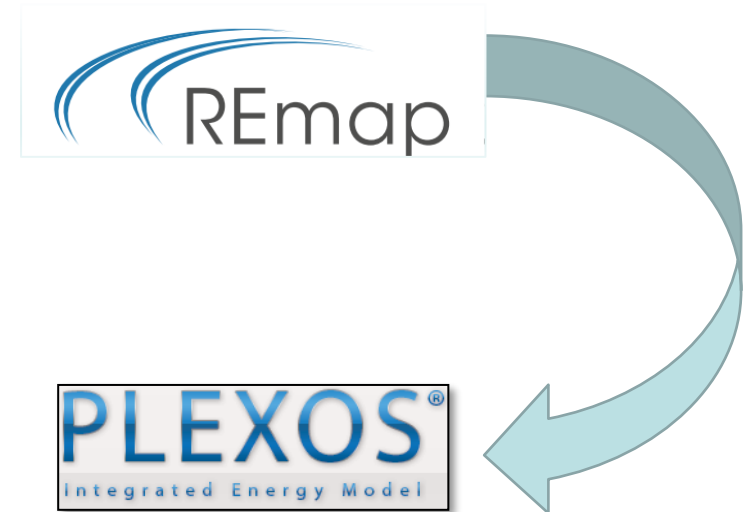
- Complementary source for applications hard to electrify.
- Available 'pockets' of sustainable potential:
 - Higher yields on cropland, crop residues.
 - Residues and sustainable extraction of forest wood.
 - Municipal solid waste and animal manure.
- Potential to roughly double sustainable supply by 2030.

By 2030, renewables can cover more than half of the electricity demand in CESEC



Power systems modelling

- Adds value and tests power sector results from REmap for electricity sector
- Done using a dedicated power system model (PLEXOS)
- Model simulates the operation of the 38 nation pan-European power system at high temporal and technical resolution for the target year.



What are the benefits of this approach?

- Offers a regional perspective on power system planning and shows how national plans interact
- Provides an understanding of how power systems can operate with high shares of renewables under operational constraints
- Coupling the REmap approach with an operational power system model allows for the strengths of both approaches to be leveraged in terms of stakeholder engagement and modelling detail.
- Possible to couple with other models for detailed national planning with higher granularity

- Generation capacity by technology and country in 2030
- Interconnection capacity between countries
- Hourly demand profiles per country
- Hourly renewable generation profiles per country

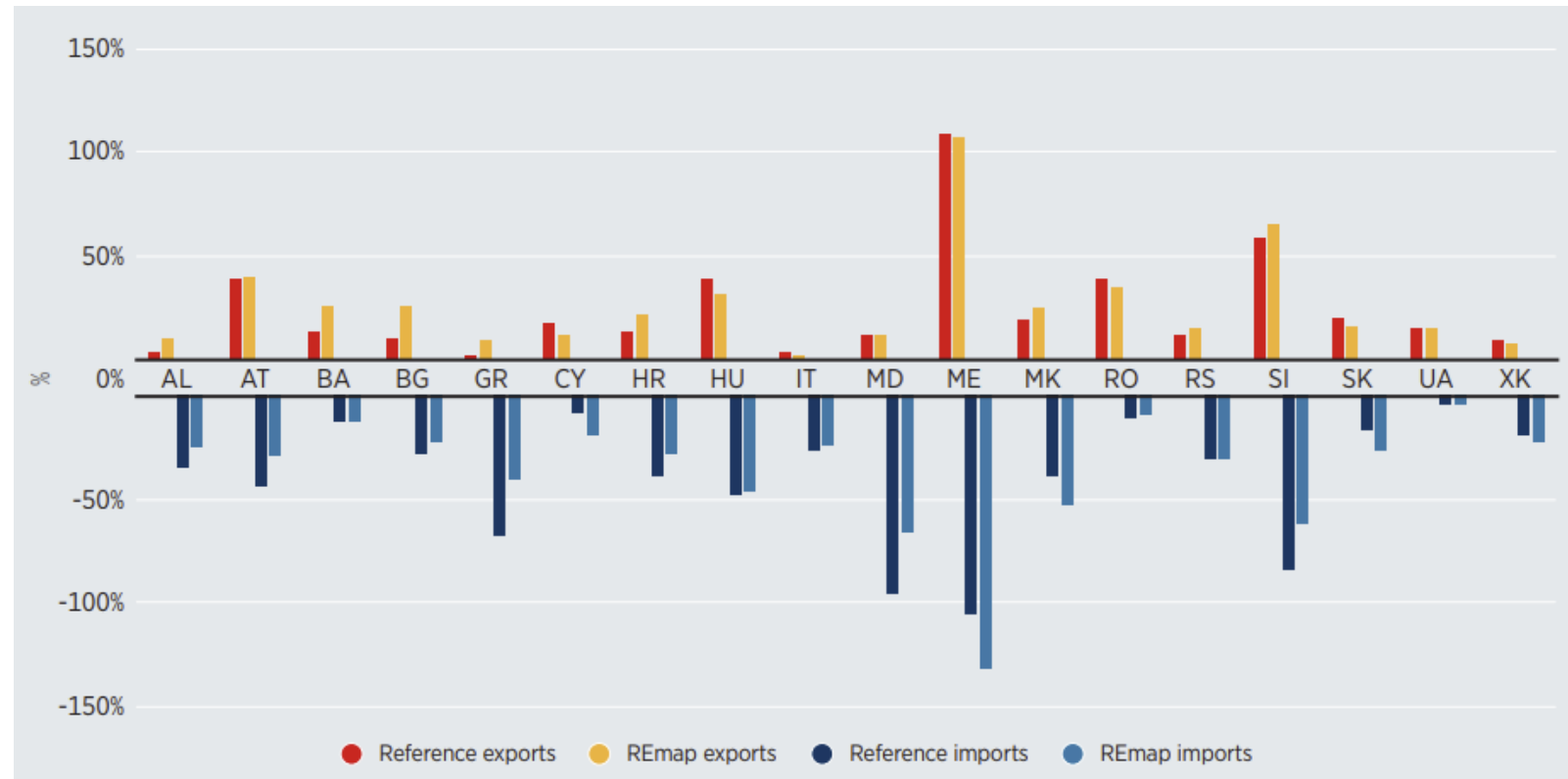


**Pan European
power sector
dispatch model**

- Renewable energy curtailment
- Wholesale prices
- Cross-border trade
- Interconnector congestion
- Operation of conventional plants
- Emissions intensity

Power import and export activity in the CESEC region 2030

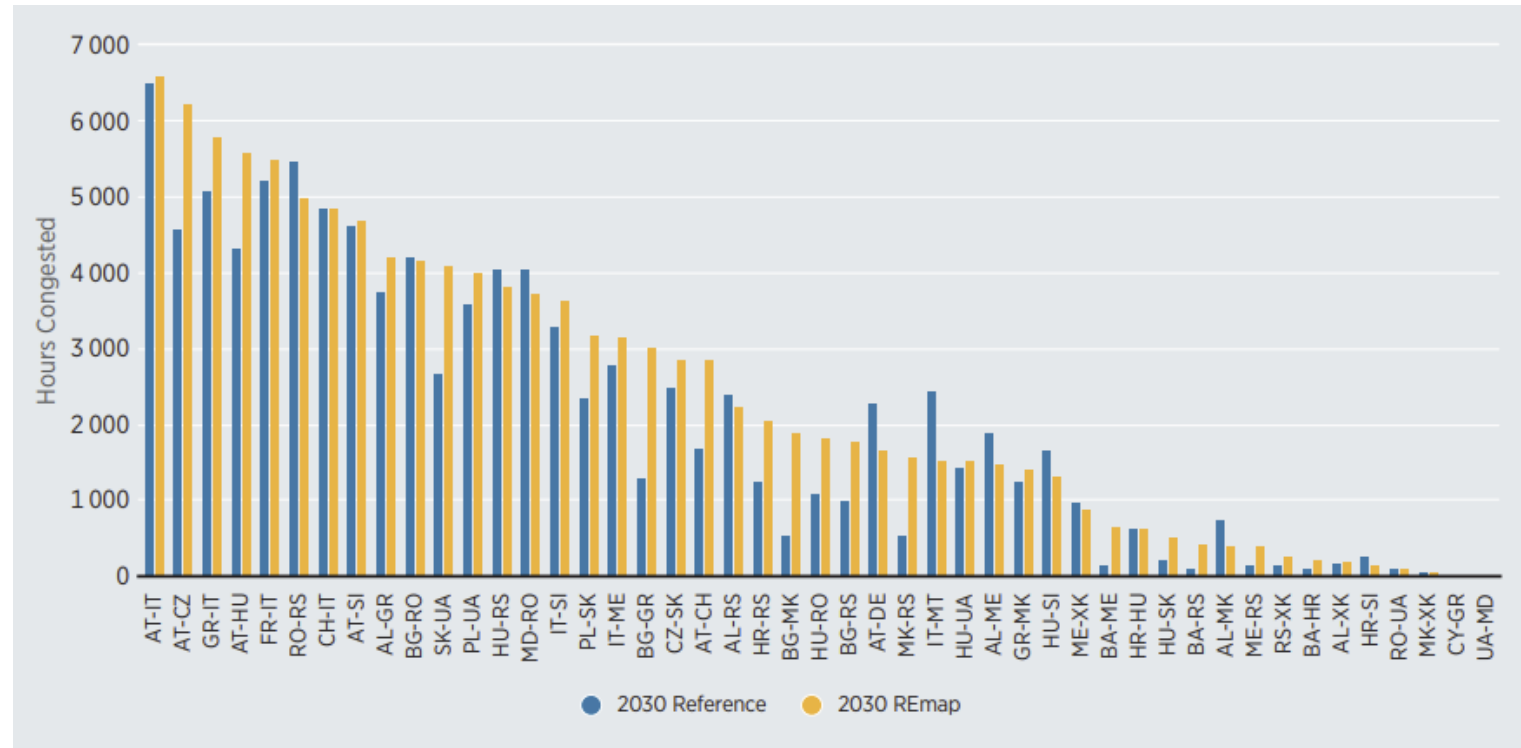
- The REmap scenario capacity mix reduces the electricity import dependency of the CESEC region from 7.3% to 5.6%, despite a 12% growth in consumption
- Evidences mutual reliance of CESEC power systems required to effectively operate a system with high shares of variable renewables.



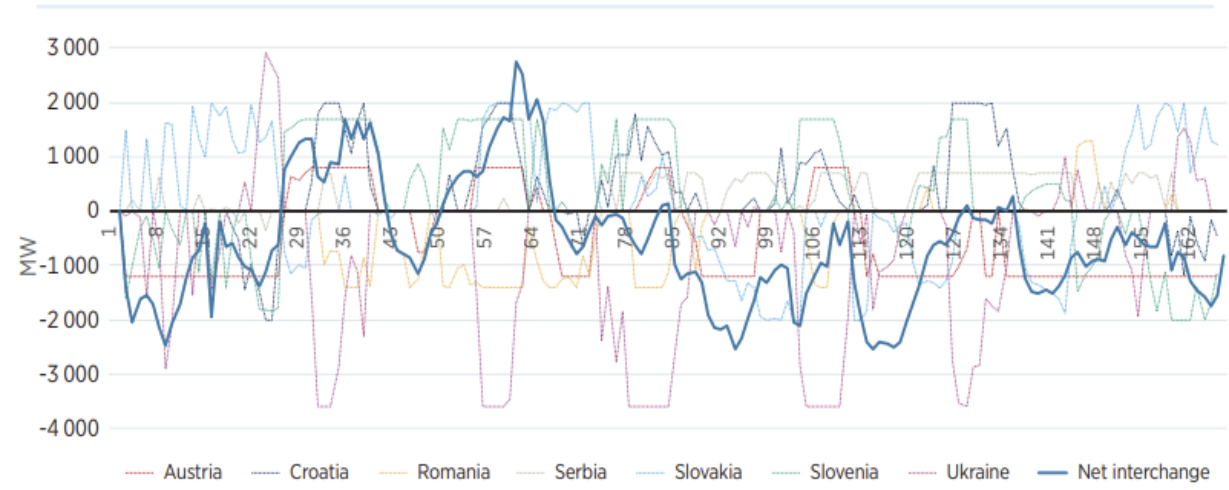
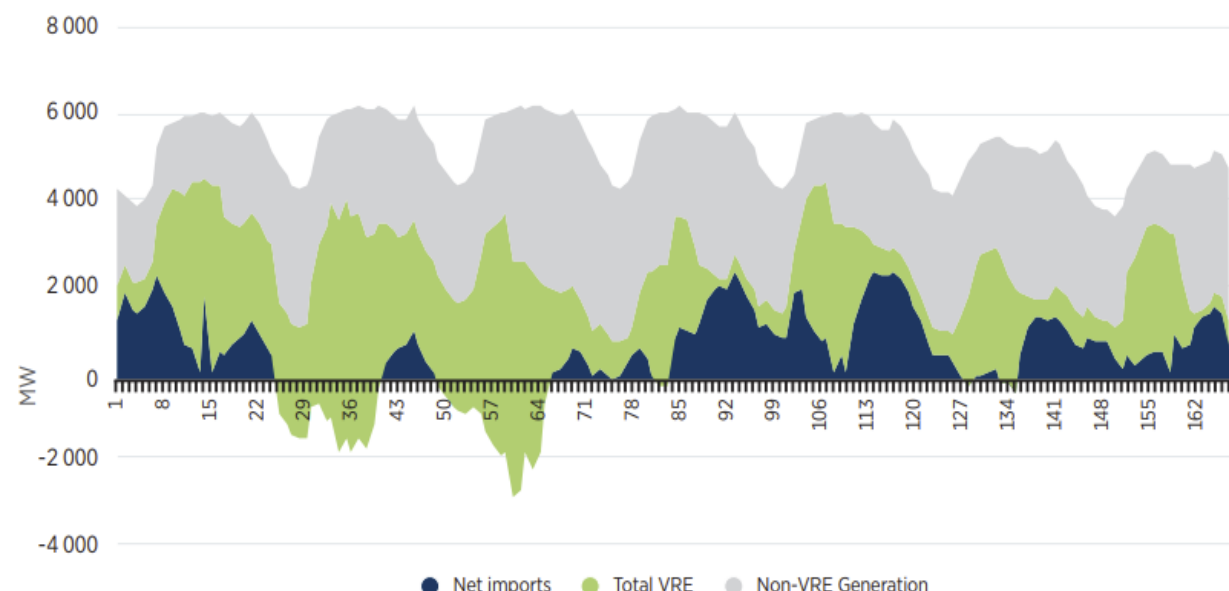
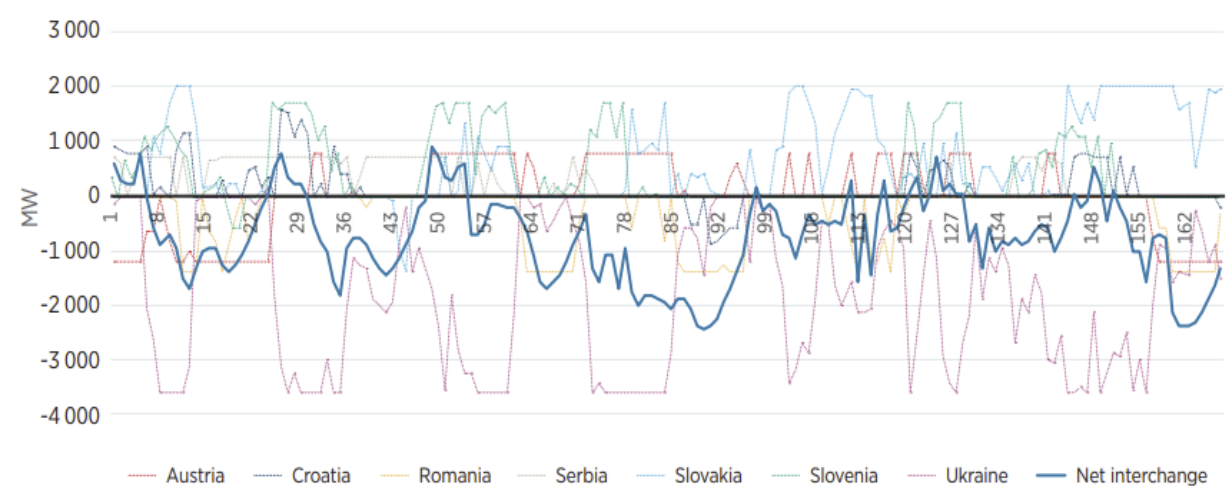
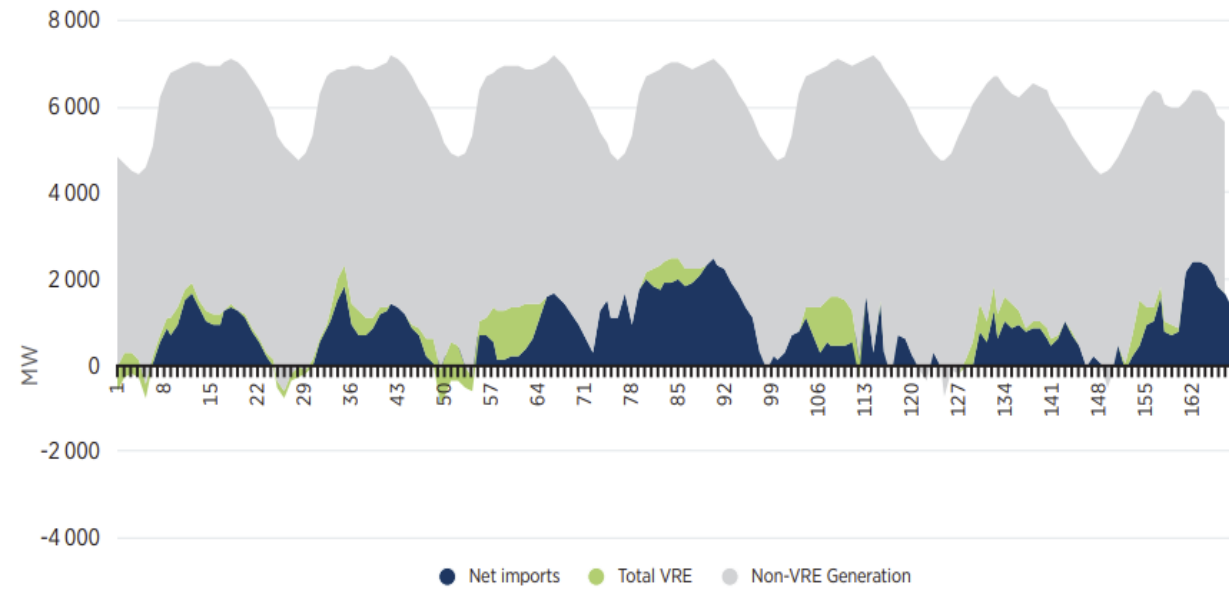
*Percentage of electricity consumption in each respective scenario for 2030

Interconnector Congestion

- Further insights into operational interdependency can be obtained from an analysis of sources and destinations of power flows.
- Weighted average congestion rate of 3 183 and 3 329 hours per year of operation at full capacity in the Reference Case and REmap scenarios
- Expanding transmission capacity both nationally and internationally would have benefits but merits a deeper analysis



Critical weeks with low (left) and high (right) VRE supply in the Hungarian power system in the 2030 REmap Case.



- CESEC can integrate high shares of renewables and achieve a renewable energy share in electricity of 58%
- Dispatch modelling of the power system provides context for renewable energy ambition for the power sector and can highlight operational concerns
- Bi-directional iterative process allowed refinement of REmap analysis
- Highlights the required system-wide focus when developing renewable energy roadmaps for interconnected regions



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