

# Dekarbonisierung des Elektrizitätssektors in Südosteuropäischen Ländern

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- Wie entsprechen der historische Verlauf und die Szenarienergebnisse des erneuerbaren Elektrizitätssektors den selbstgesteckten Zielen der nationalen Aktionspläne Südosteuropäischen Ländern?
- Welche Ergebnisse liefern modellbasierte Evaluierungen der Südosteuropäischen Ländern in Hinblick auf die bis 2050 angestrebte weitgehende Dekarbonisierung des Sektors der Stromerzeugung?
- Ein Vergleich von verschiedenen Ausbauszenarien soll ein detailliertes Verständnis für den Stand, die Aussichten und Herausforderungen der erneuerbaren Energien im Stromsektor innerhalb der Südosteuropäischen Länder liefern.

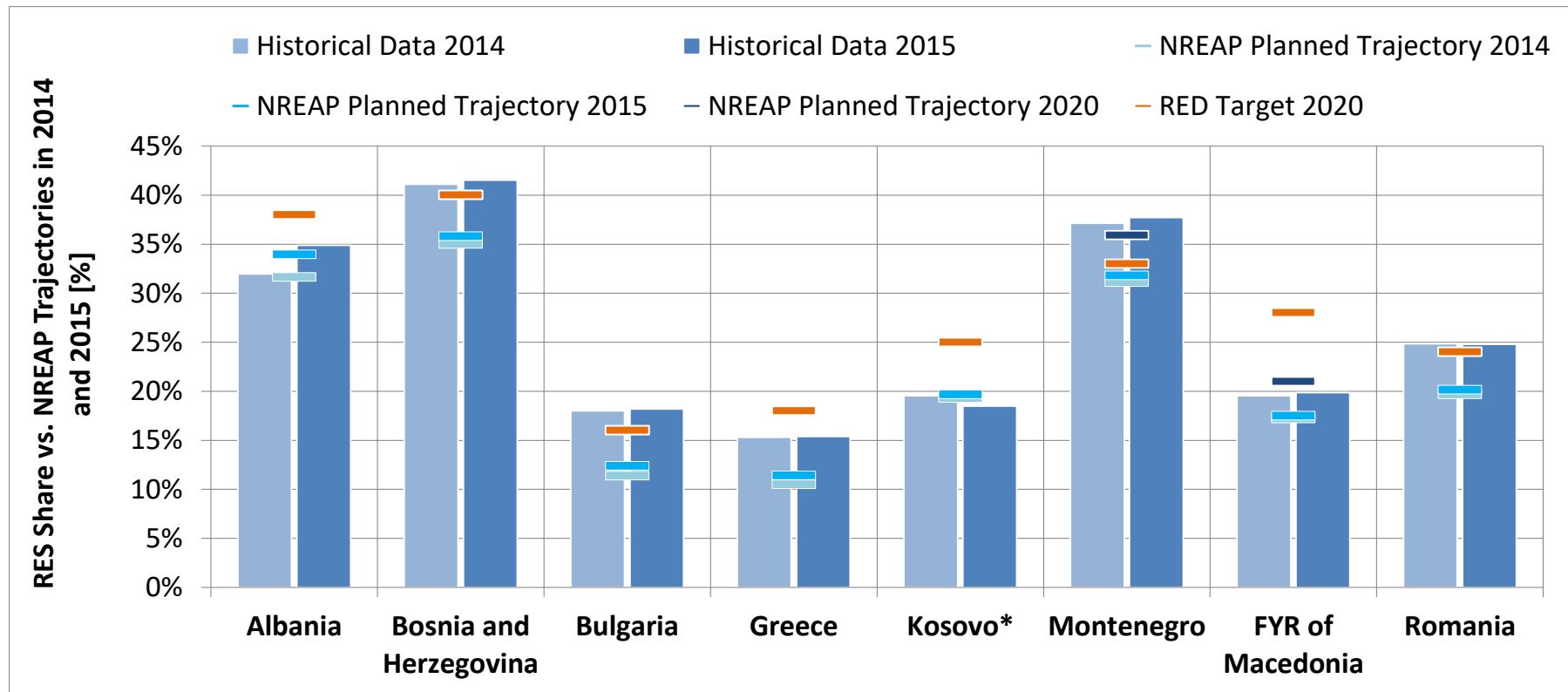
# SEERMAP

## South East Europe Electricity Roadmap

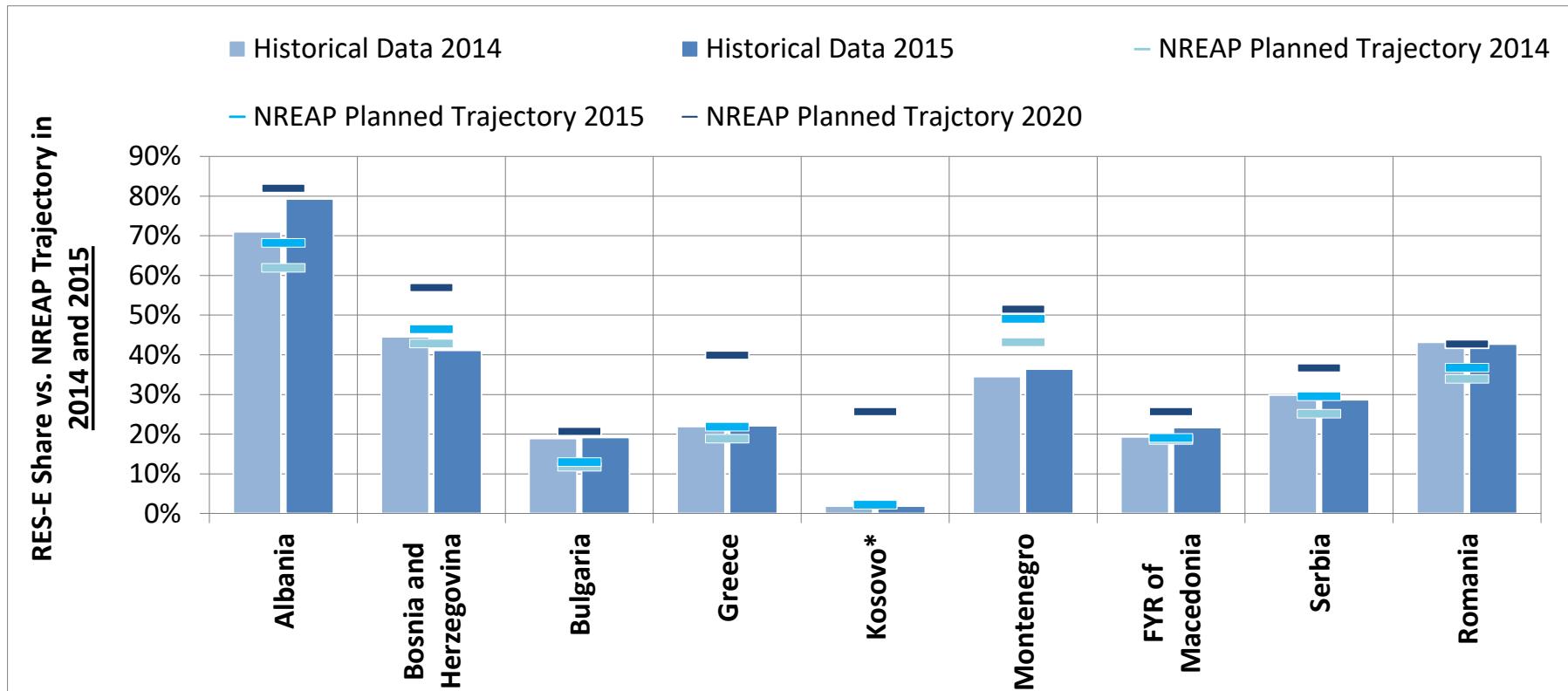
- ▶ Region of implementation:  
Albania, Bosnia and Herzegovina, Kosovo\*, Montenegro, Macedonia, Serbia, Romania, Bulgaria, Greece
- ▶ Consortium Partners:  
REKK, TU Wien, OG Research, EKC
- ▶ July 2016 to October 2017
- ▶ Donors: Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management;  
European Climate Foundation
- ▶ Web:  
[www.seermap.rekk.hu](http://www.seermap.rekk.hu)

- Part of the EU and SEERMAP region
- EU Candidate Country and part of the SEERMAP region





- All countries fulfilled their NREAP trajectories in 2014
- Only Kosovo\* and FYR of Macedonia failed their NREAP trajectories in 2015
- 4 out of 8 countries already fulfilled their 2020 target in 2015



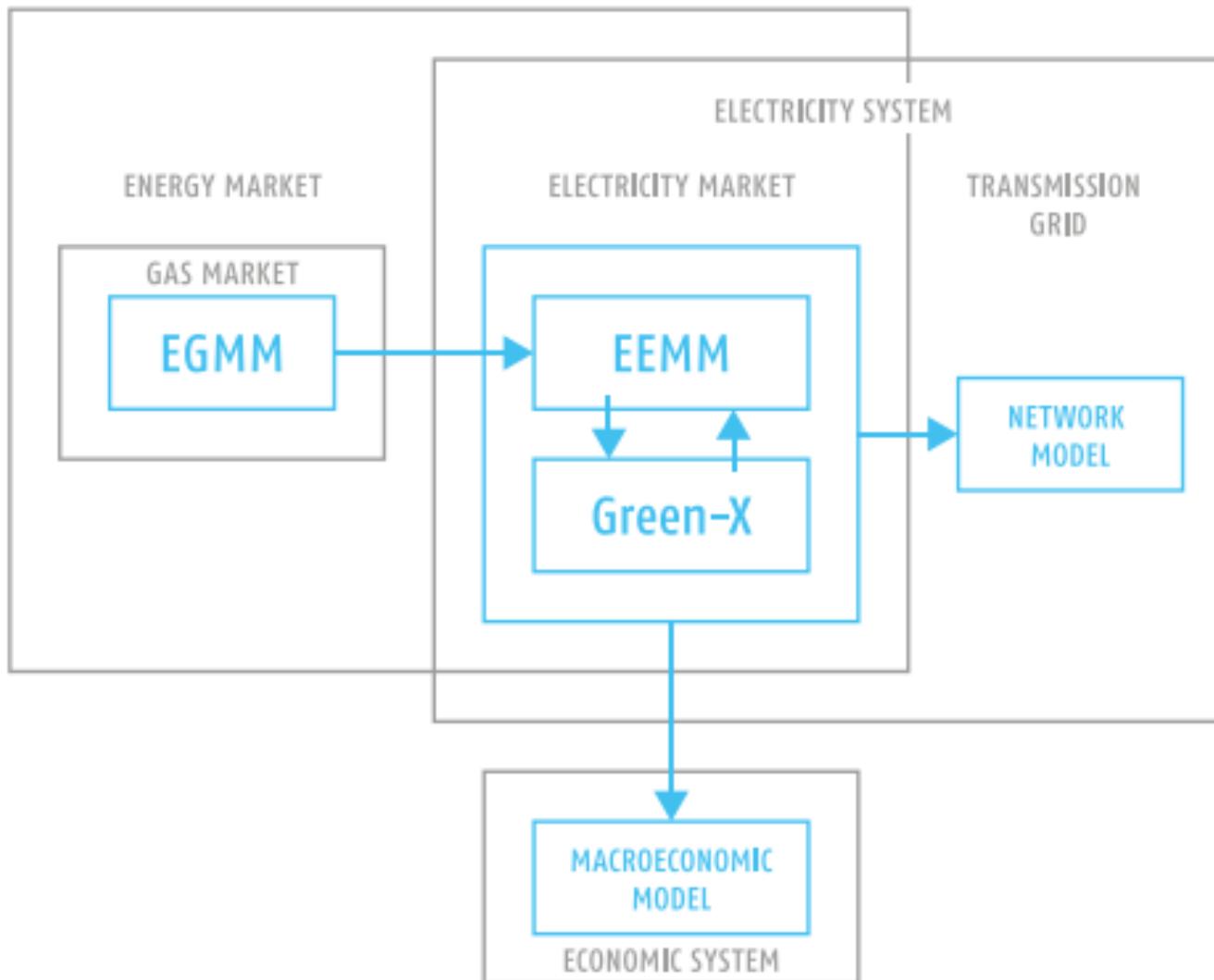
- Montenegro and Kosovo\* failed its NREAP trajectories in 2014
- Only Albania, Bulgaria, Greece, FYR of Macedonia and Romania fulfilled their trajectories in 2015
- No country already fulfilled their 2020 target in 2015

## Modelling

- Analyse the impact of the transition to a low carbon and energy secure pathway the electricity sector until 2050 in line with EU 2050 Roadmap
- Develop of a Long Term Electricity Roadmap for the SEE region and effectively distribute the findings to the high level decision-makers - Promote a regional integration scenario

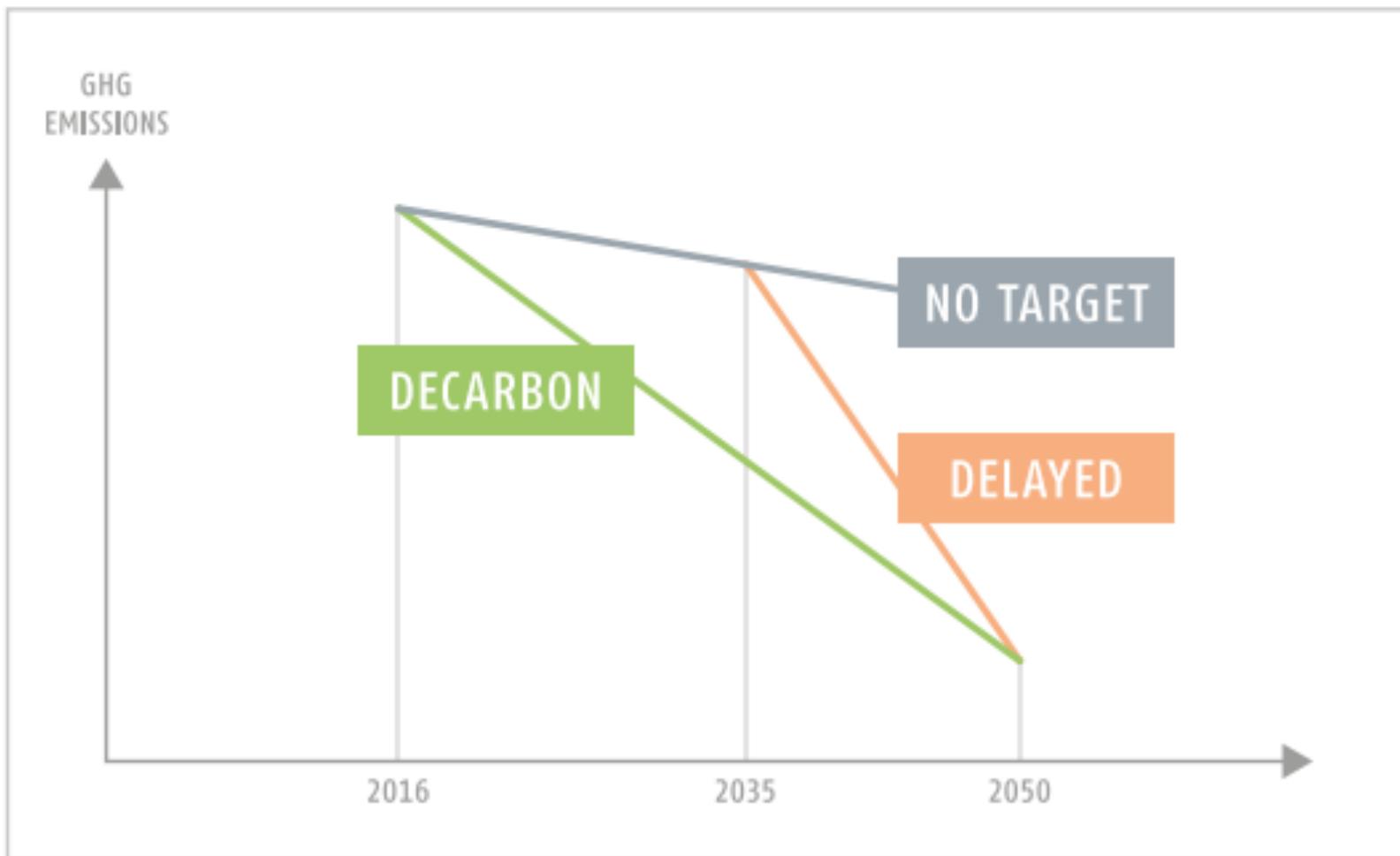
## Dialogue and capacity building

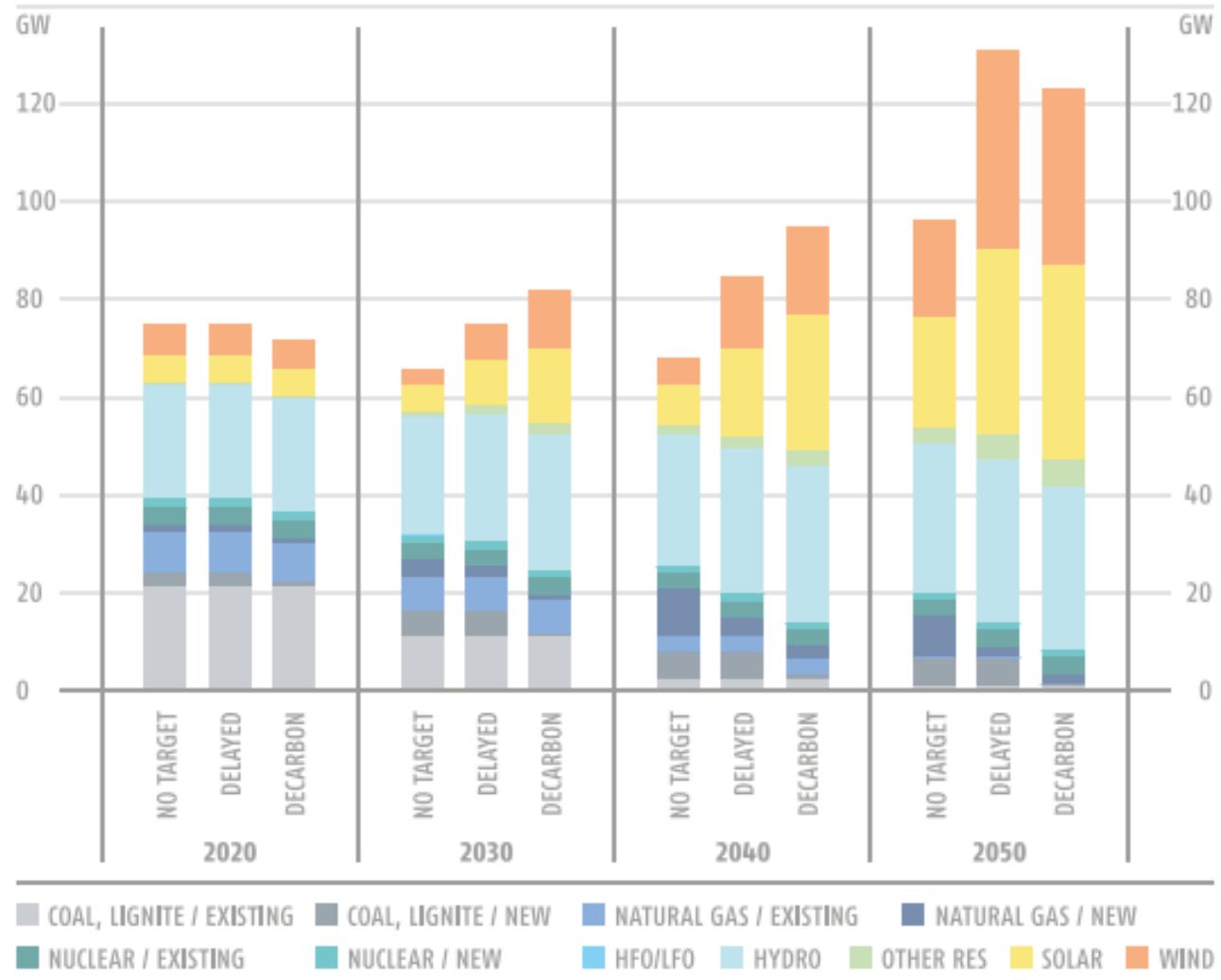
- Build up capacities – in the form of training courses - amongst policy makers, TSO members, energy regulators and local think tanks in the field of renewable energy deployment and transmission network planning issues
- Build up a network of regional think tanks capable of contributing to the debate on the long term decarbonisation pathways in the SEE region
- Trigger discussions on electricity scenarios at a national level in the region



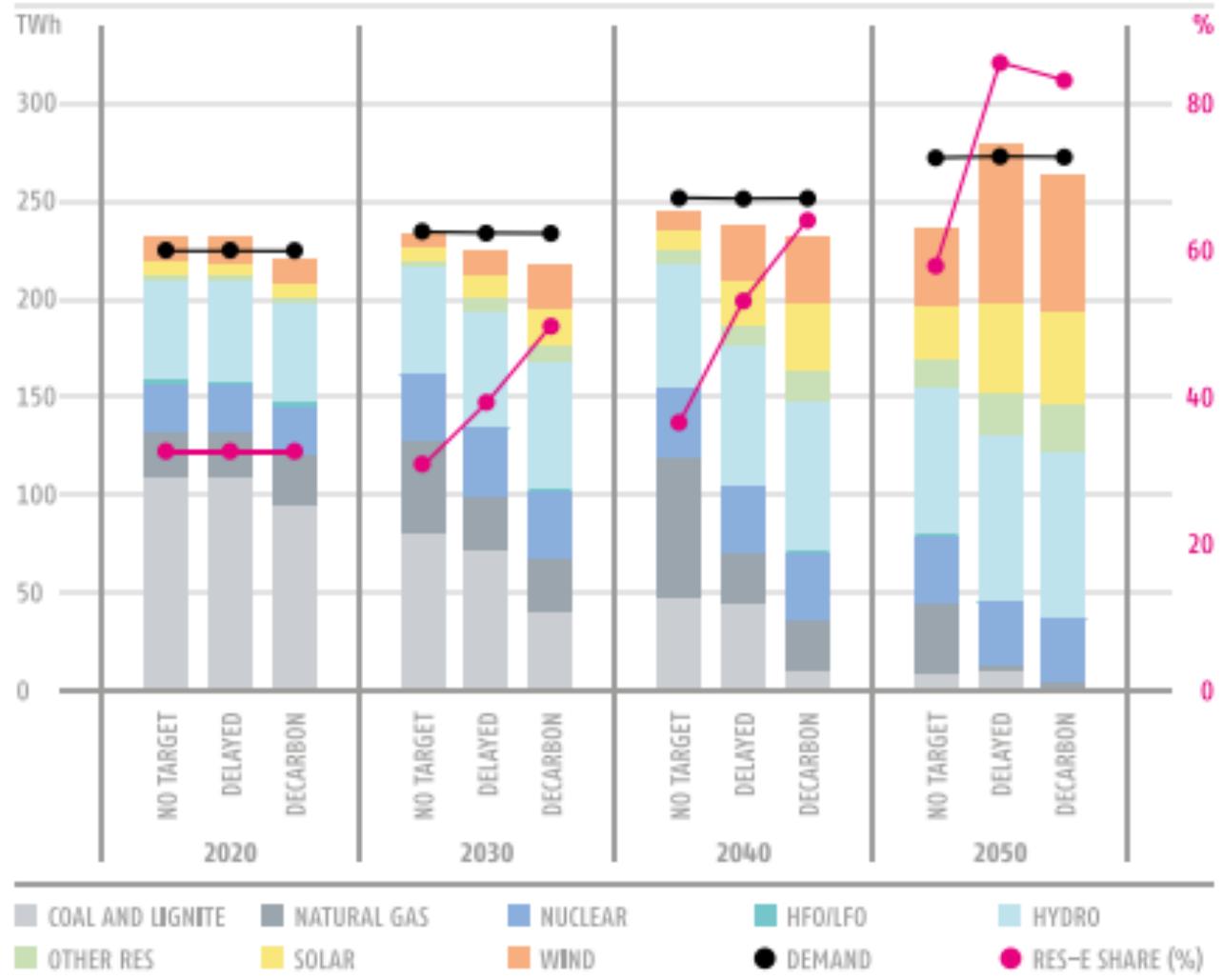
	No Target	Delayed	Decarbonization
CO <sub>2</sub> target	No target	94% reduction	94% reduction
Fossil plants	National plans: all PPs	National plans: all PPs	National plans: only PPs with FID
SEERMAP RES target	Phase out of support after 2025	Continuation of current policies till 2035 and than high uptake	More ambitious RES deployment from 2020 to reach the 2050 target
Shared assumptions	Demand, CO <sub>2</sub> (2030: 33 €/tCO <sub>2</sub> , 2050: 88€/tCO <sub>2</sub> ) and fossil fuel prices, gas infrastructure, WACC, NTCs		

# Die Annahmen hinter den Szenarien



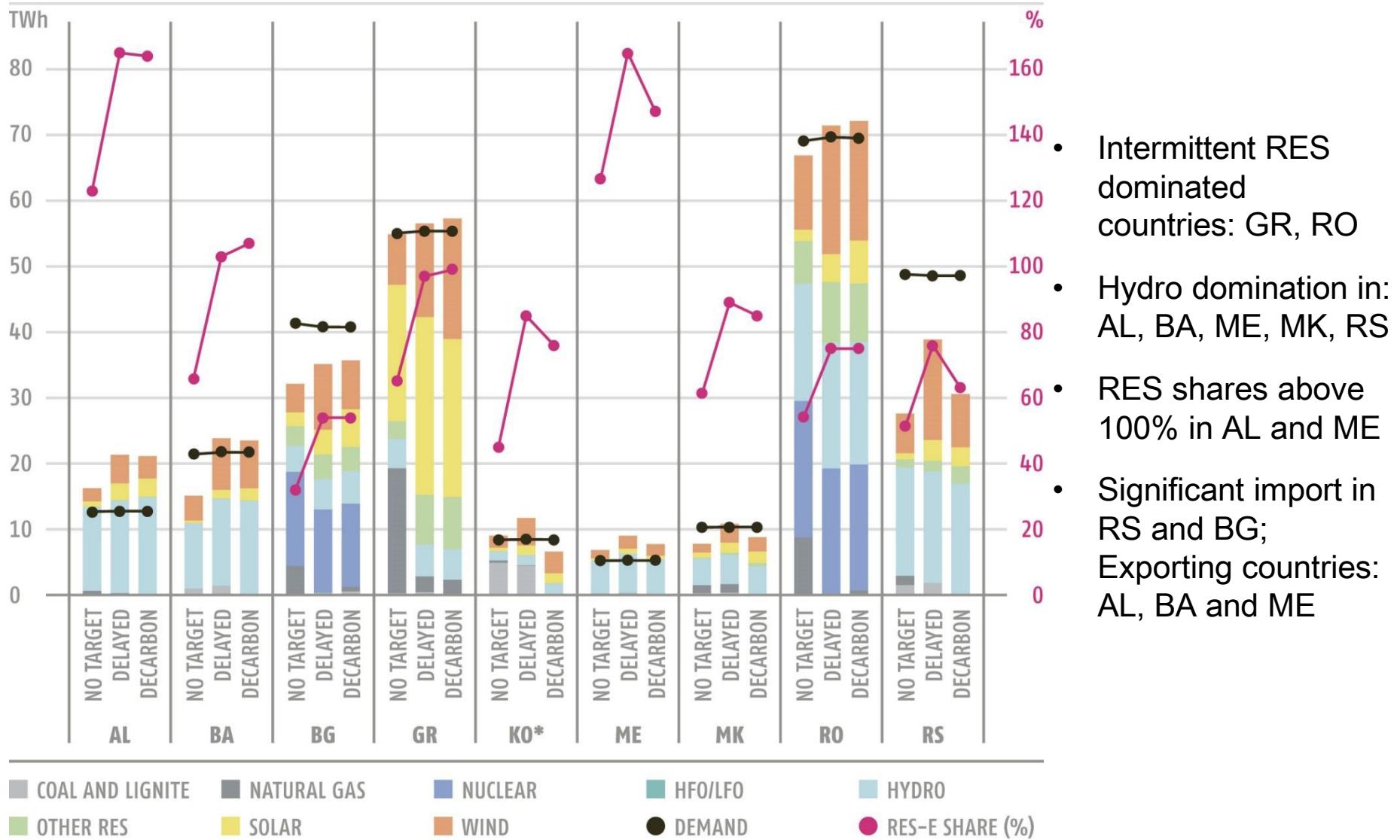


- Gradual phase out of fossil capacities
- Role of natural gas is uncertain: bridging role in 'decarbonisation' and 'delayed' scenario, where gas is crowded out from the market, and more permanent role in the 'no target'
- Dynamic uptake of RES technologies, especially wind and solar – including the 'no target' scenario

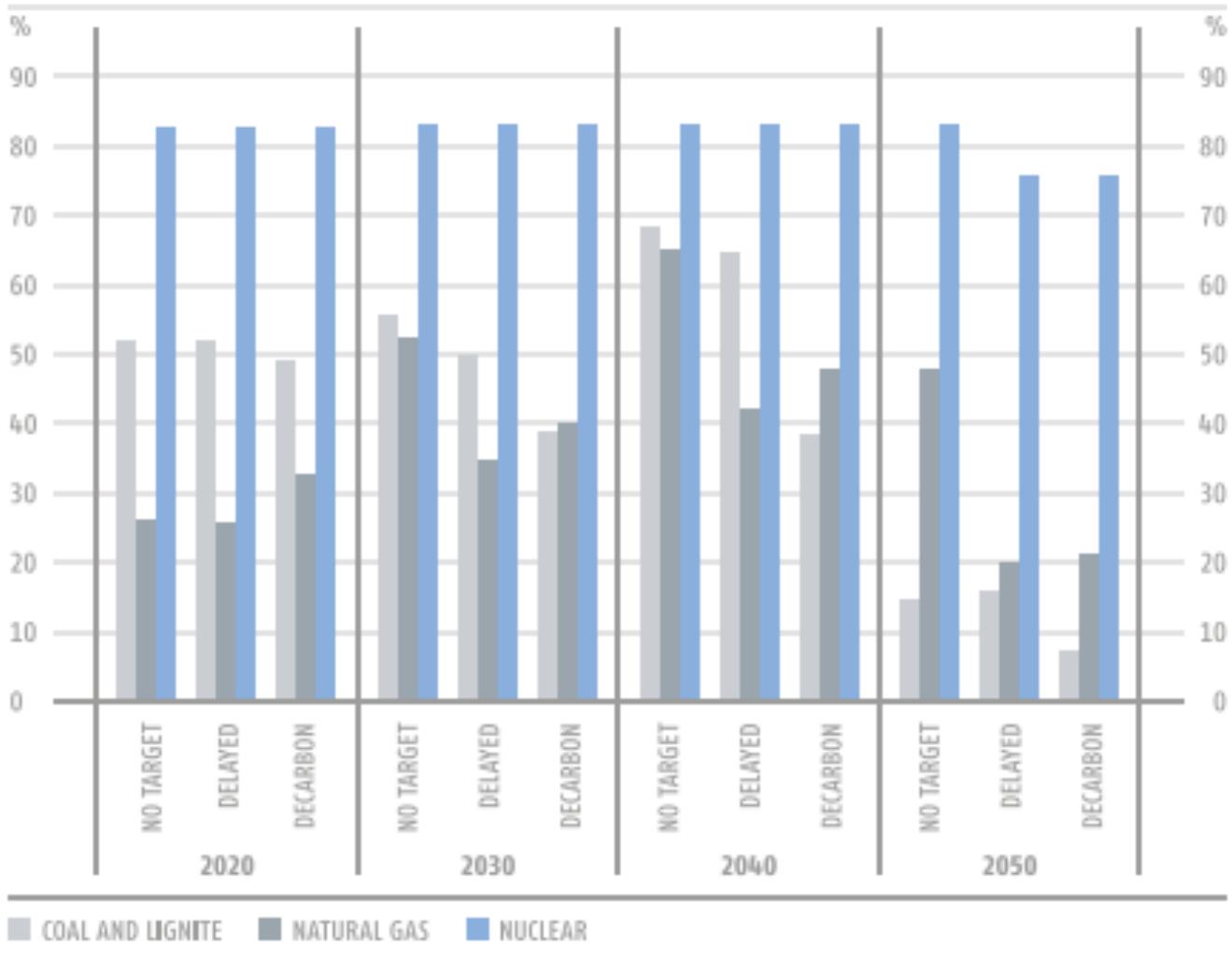


- Coal based generation disappears from electricity mix
- Gas consumption peaks in 2030-2040, and downward trend afterwards.
- Trade position of the region slightly deteriorates
- RES domination in the generation mix after 2030

# Strom MIX auf Länderebene

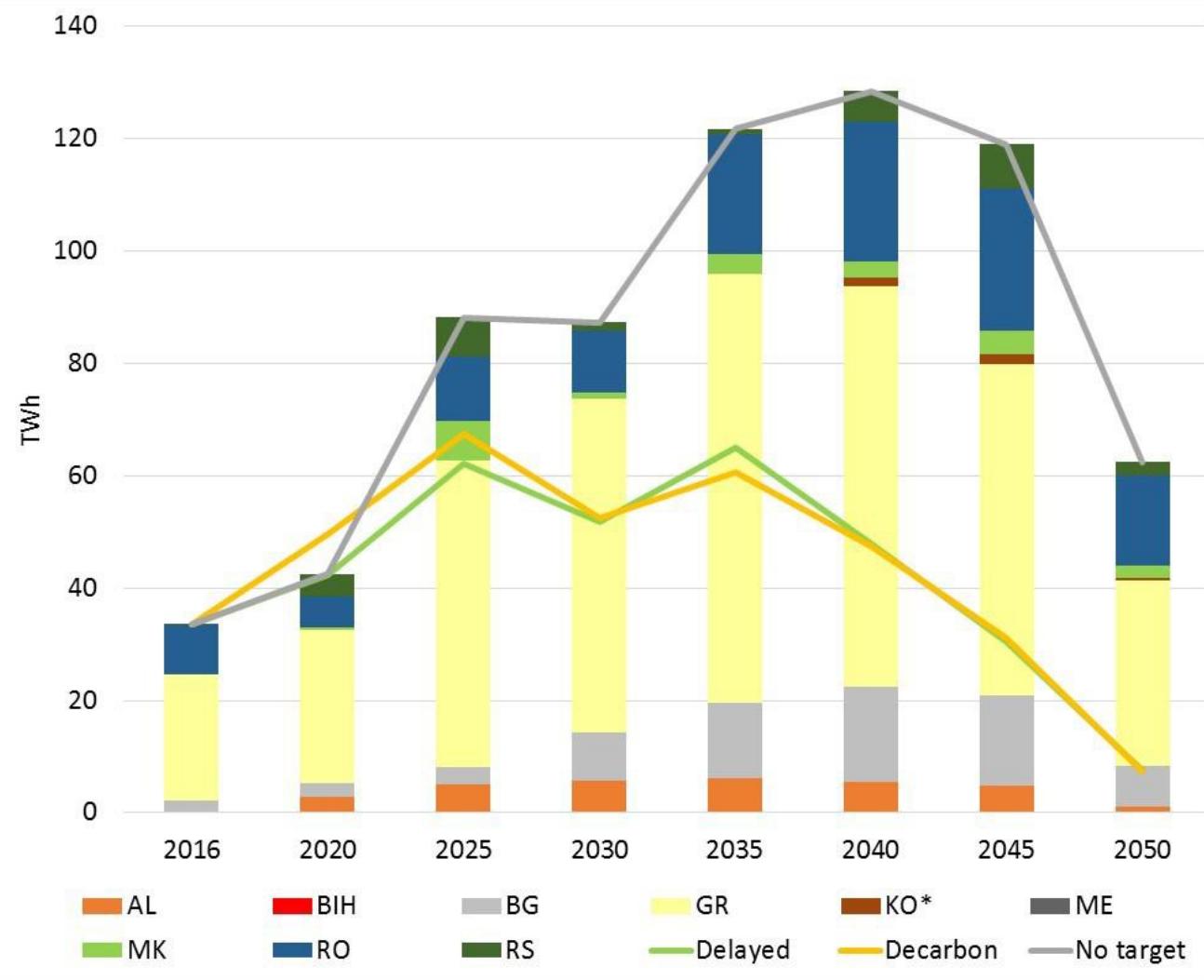


# Nutzung von konventionellen Kraftwerken



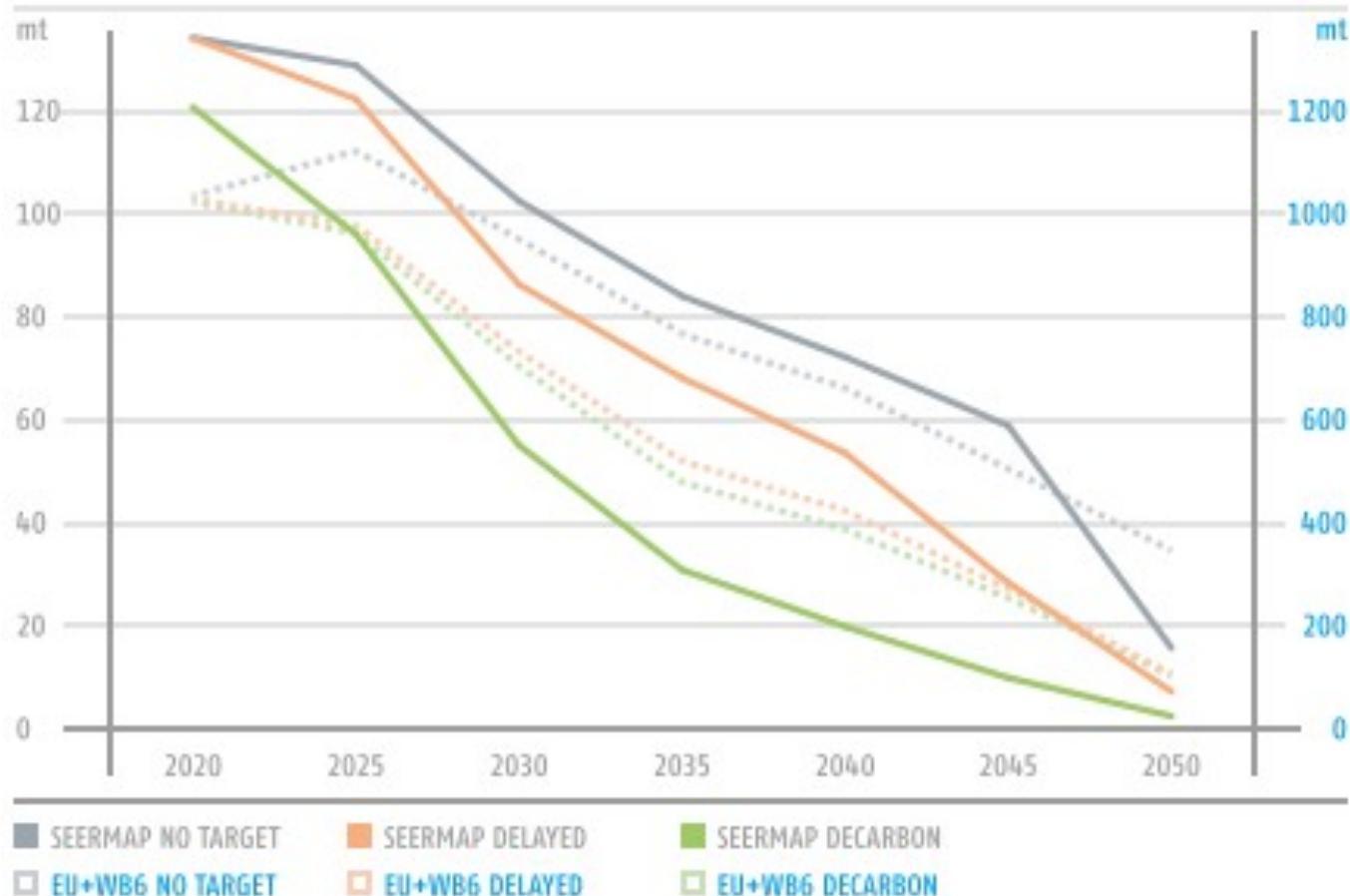
- Sharp decrease in gas and coal utilisation rates after 2040. Coal rates fall below economically sustainable levels.
- Gas takes over coal generation with increasing rates in 2030-2040.
- Even nuclear utilisation reduces in 2050 due to high RES penetration.

# Erdgasverbrauch in der Stromerzeugung



- Bridging role of natural gas in all scenarios
- In 'delayed' and 'decarbonisation' scenario gas based generation is crowded out from the market by 2050
- GR, RO and BG are the large gas consumers. In WB6 AL, MK and RS show the highest increase

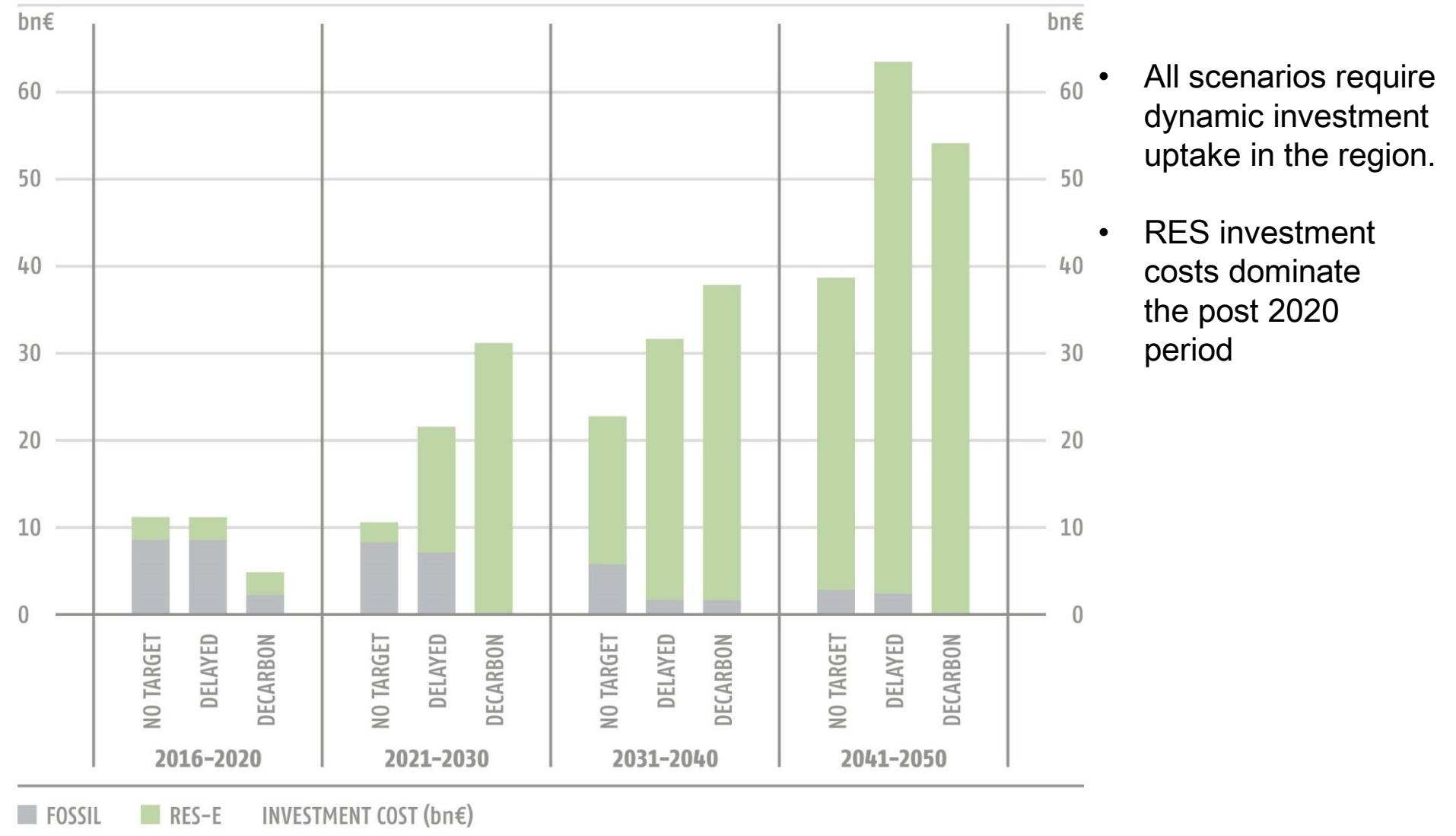
# CO<sub>2</sub> Emissionen

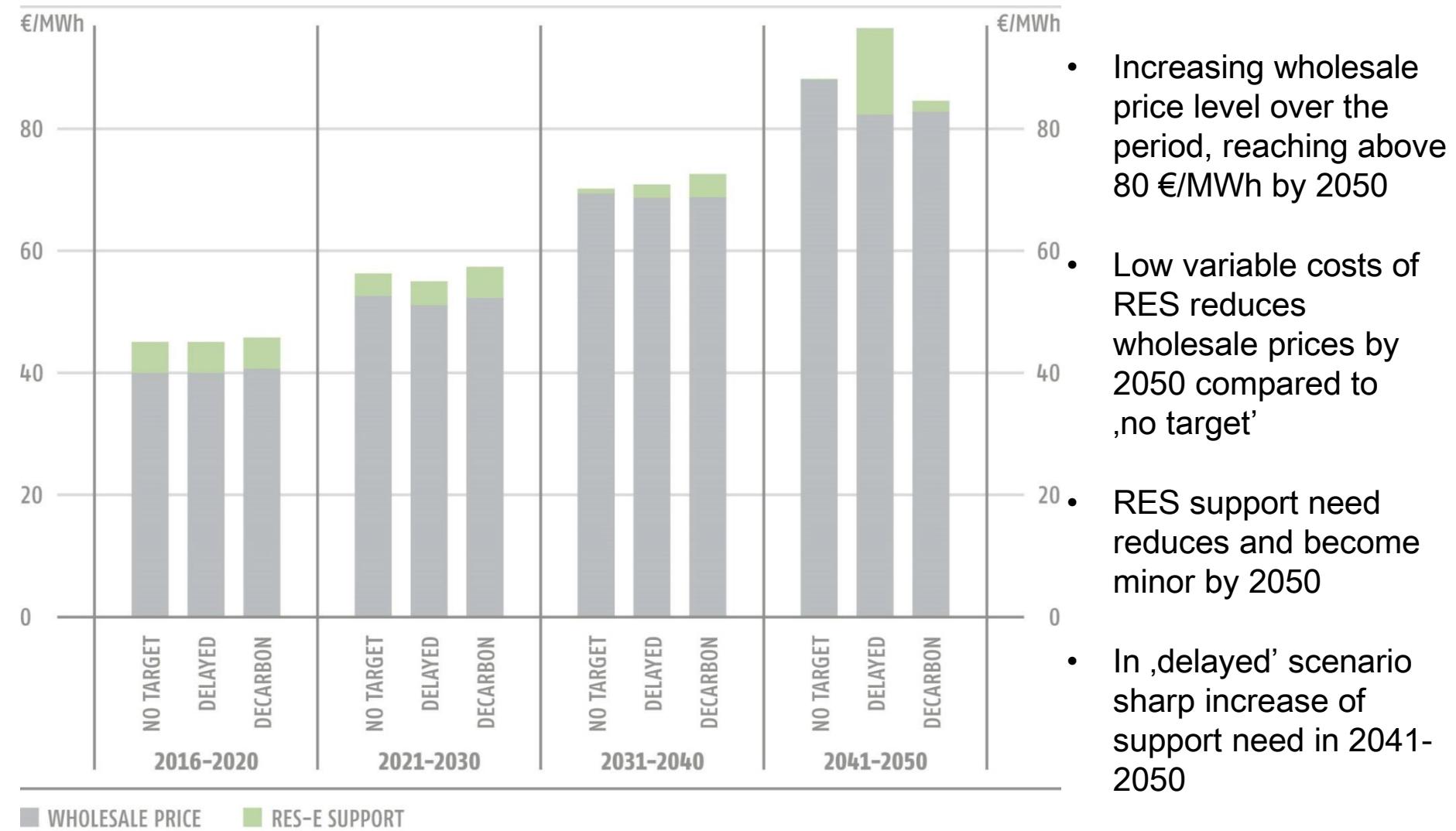


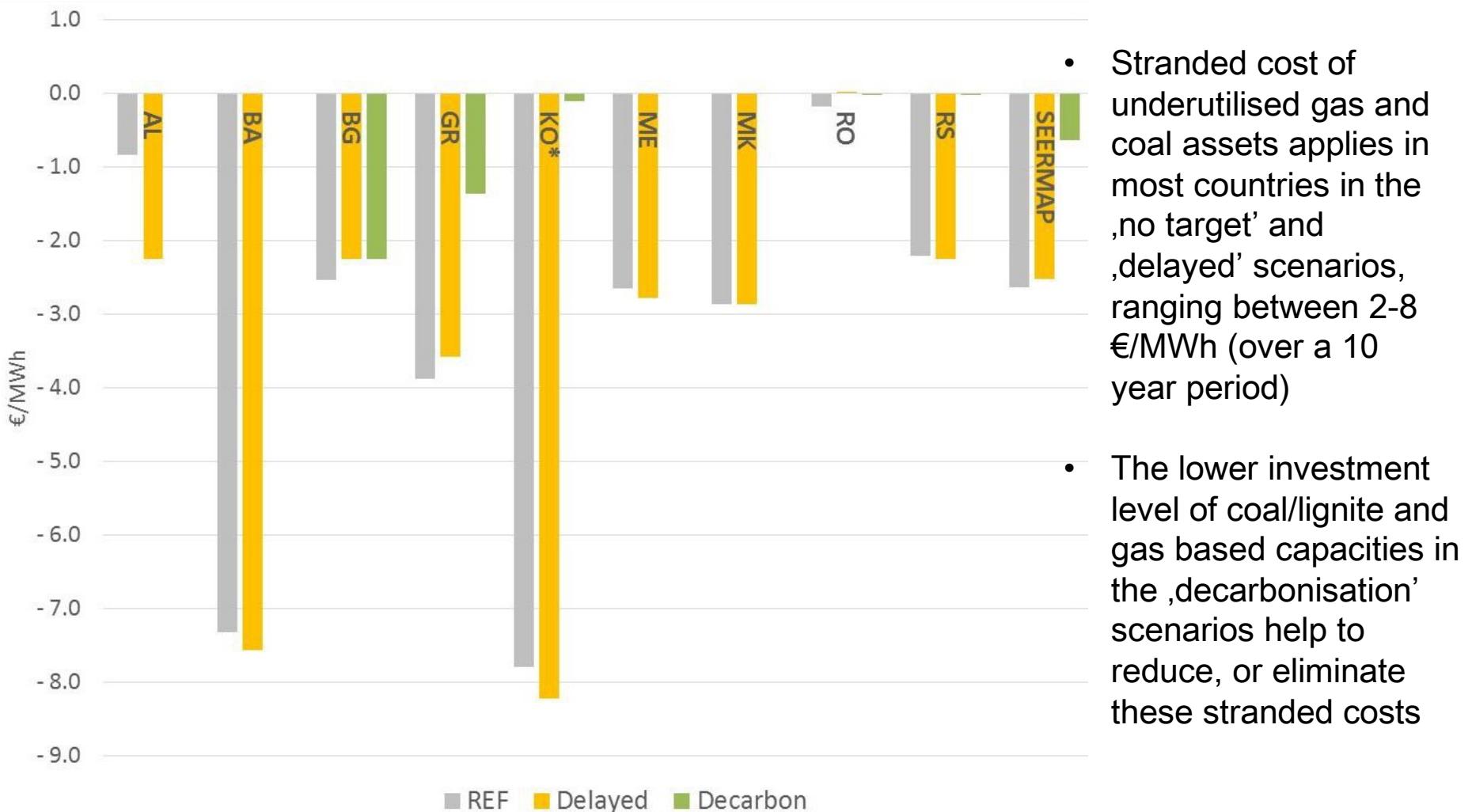
- Sharp CO<sub>2</sub> reductions in the region: over 98% in the 'decarbonisation' scenario
- Even the 'no target' scenario reaches 90% reduction rate by 2050
- Higher reduction rates than EU average—SEERMAP region can contribute to the reduction target efficiently

SEERMAP: left hand axis, EU28+WB6: right hand axis

# Investitionskosten







## Market integration

- Introduction of competitive market is a key driver for the SEE electricity sector: support RES deployment, price equalisation.
- No need for massive cross border capacity increase, rather functioning market institutions.

## Natural gas

- Role of gas is transitional in electricity generation:
  - in the ‚no target‘ scenario it peaks at 2040
  - in the ‚delayed‘ and ‚decarbonisation‘ scenarios it is fully replaced by RES by 2050

## Coal

- Gradual elimination of coal capacity and production in all scenarios
- Very low utilization from 2040 onwards (below 20% - closure)
- Stranded cost in these assets ranges between 2-8 €/MWh

## Security of supply

- The ‚new‘ domestic resource: RES replaces coal/lignite based generation
- The substitution however results in significant electricity import in many WB6 countries (MK and RS) but dynamic RES deployment supports self-sufficiency
- System adequacy remains high in all scenarios, although generation adequacy deteriorates

## RES deployment

- RES deployment increases in all scenarios, even without support significant growth after 2040
- RES support level reduction helped by increased wholesale prices and reducing technology costs

- The high penetration of renewables in all scenarios suggests that energy policy, both at the national and regional level, should focus on enabling RES integration
- National energy policy will have less influence on the future generation mix – it will be driven by market forces
- EU and regional level policies should be incorporated in national energy planning
- Stranded costs should be carefully considered in fossil generation and gas network investment decisions
- Household electricity expenditure increase significantly in some countries, it may require new policy approach
- Regional cooperation helps to handle SoS issues and reduce costs of decarbonisation

# Danke für Ihre Aufmersamkeit!

## Literatur

- [1] Szabó, L., Mezosi, A., Pató, Z., Kelemen, Á., Beöthy, Á., Káscor, E., Kaderják, P., Resch, G., Liebmann, L., Kovács, M., Köber, C., Marković, S., Todorović, D. (2017), SEERMAP: South East Europe Electricity Roadmap - South East Europe Regional report 2017, Regional Centre for Energy Policy Research: Budapest, <http://seermap.rekk.hu>.

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