Powering the future of the Western Balkans with renewables

enervis presentation

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Three power market scenarios were designed, modeled & analysed to compare different energy policy strategies.

METHODOLOGY

SCENARIO DESIGN
- Definition of political scenarios
- Basis for power market modeling

ASSUMPTIONS
- Techno-economic parameters
- Fuel prices
- RES, coal trajectories

MODELING
- Plant dispatch & investment to 2050
- Capacity & generation mix

RESULTS
- CO_2- and other emissions
- Investment needs
- Total system costs

CORE SCENARIOS

	DESCRIPTION	NET-ZERO DEADLINE	DECARBONISATION TECHNOLOGIES
FOSSIL BASELINE	Baseline scenario with current ambition level, no lignite exit, no power sector decarbonisation	-	
GAS LOCK-IN	Net-zero power sector scenario with RES & H2, early investments into fossil gas plants, late retrofit to H2	2045	H_2
SMART TRANSITION	Net-zero power sector scenario with RES, H2 & storages, earlier H2-readiness of gas units	2045	H_2

ADD. SENSITIVITIES

- INCREASE IN H2 COSTS
- REDOX-FLOW BREAKTHROUGH
- THERMAL STORAGE BREAKTHROUGH

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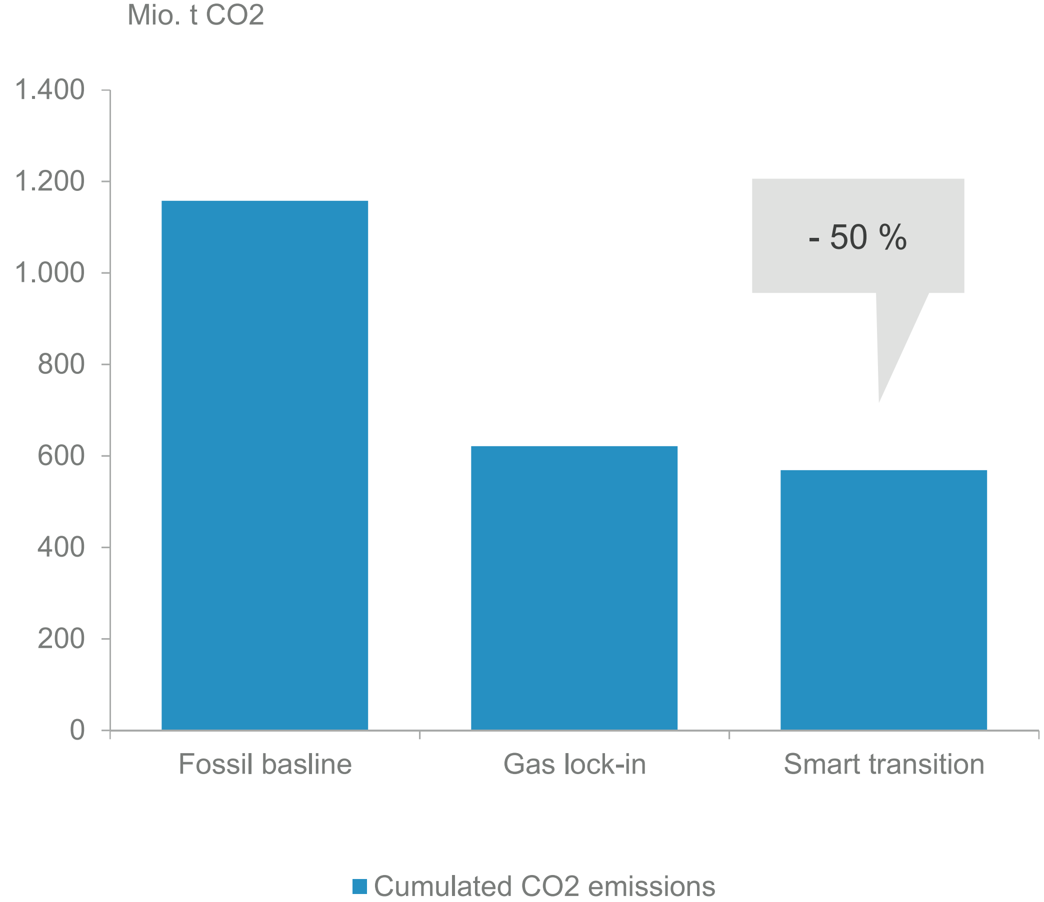
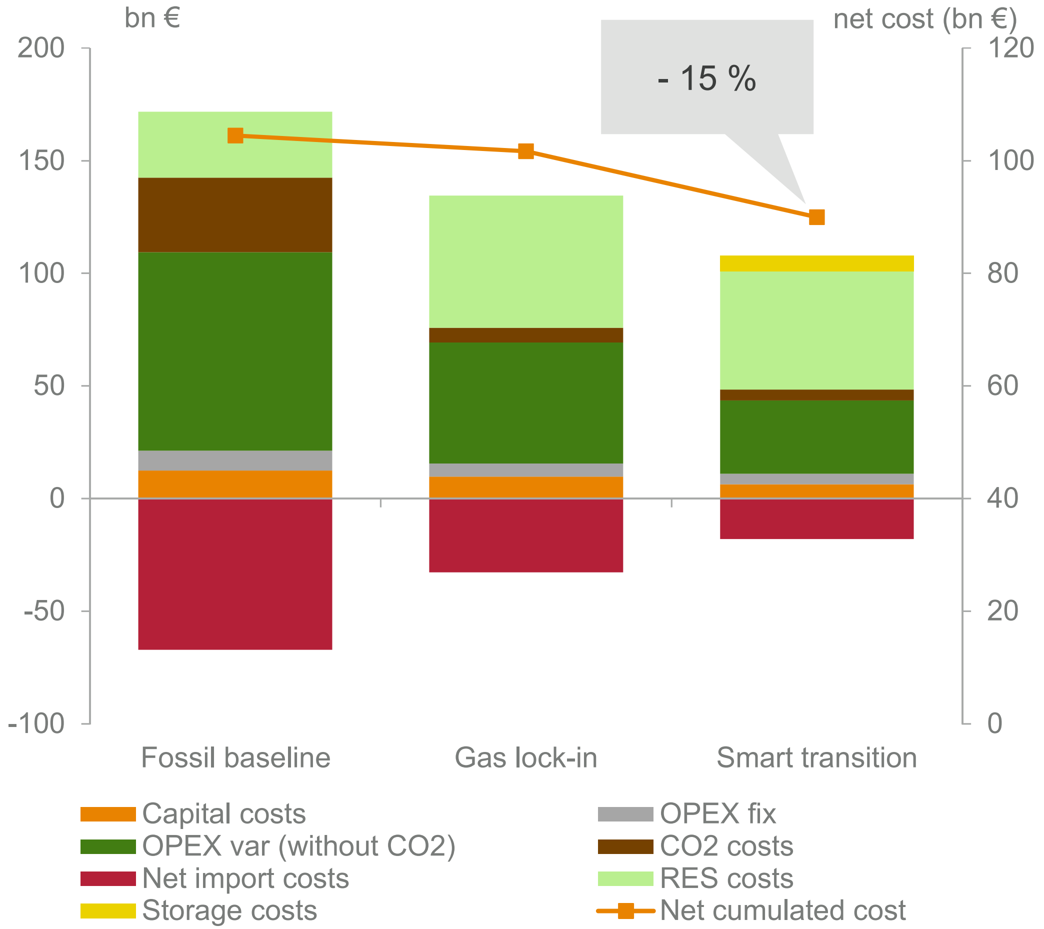
A net-zero scenario with diverse technology portfolio cuts carbon emissions while resulting in lower incremental generation costs

Cumulated CO_2 emissions 2022-2050

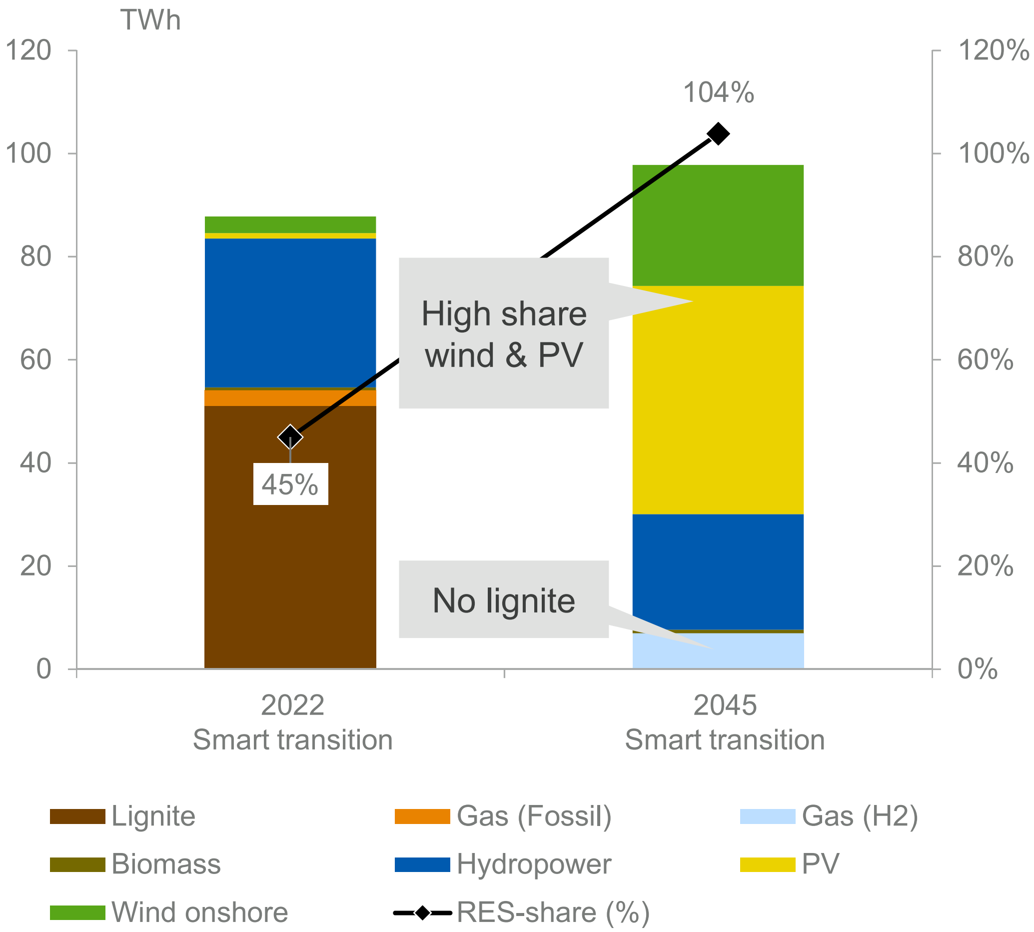


Incremental generation costs 2022-2050

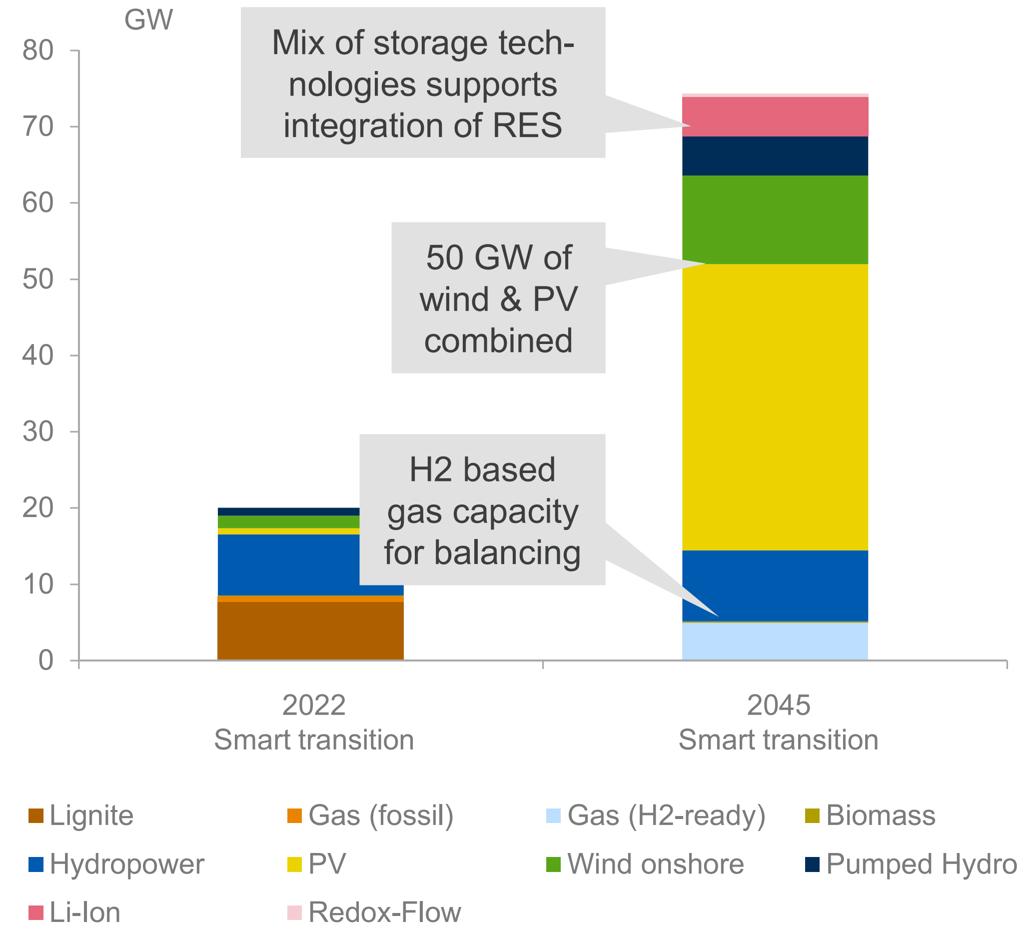


RES & storage based power system delivering these results implies adding roughly 50 GW of onshore wind and PV capacities in the next three decades

Generation mix in Smart transition sc.

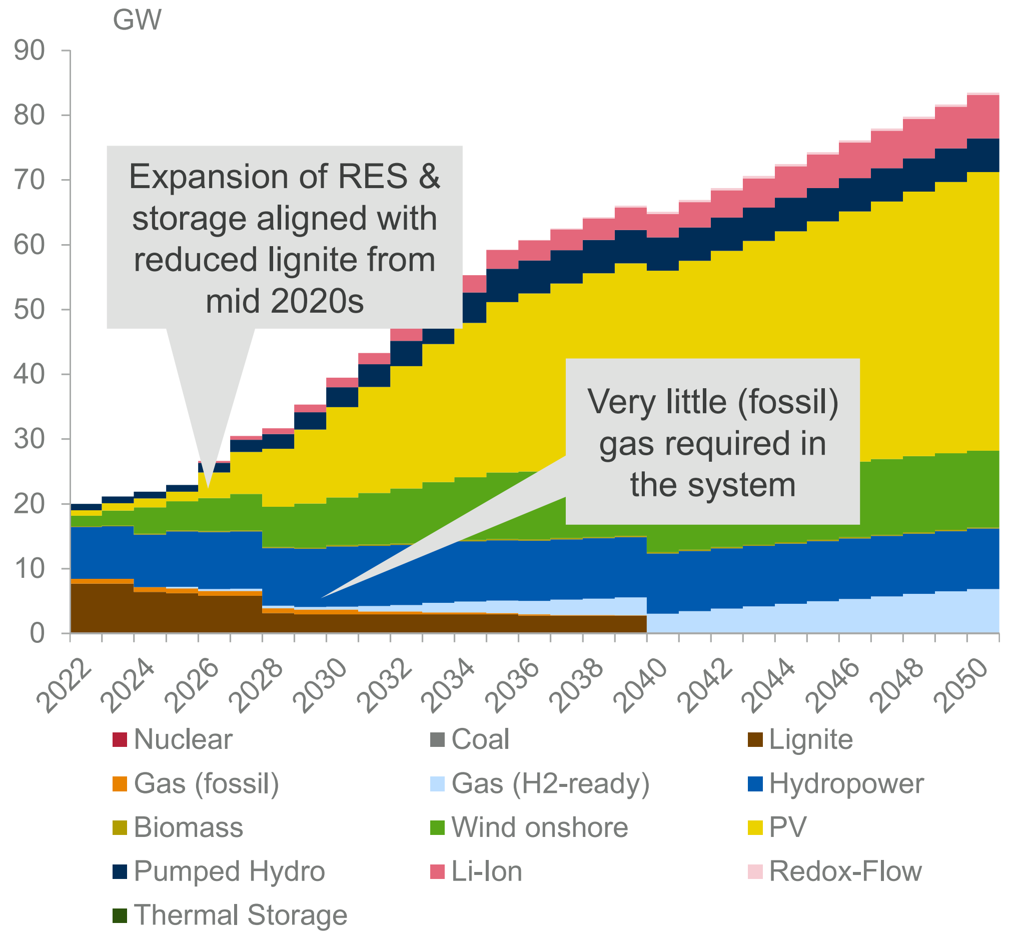


Capacity mix in Smart transition sc.

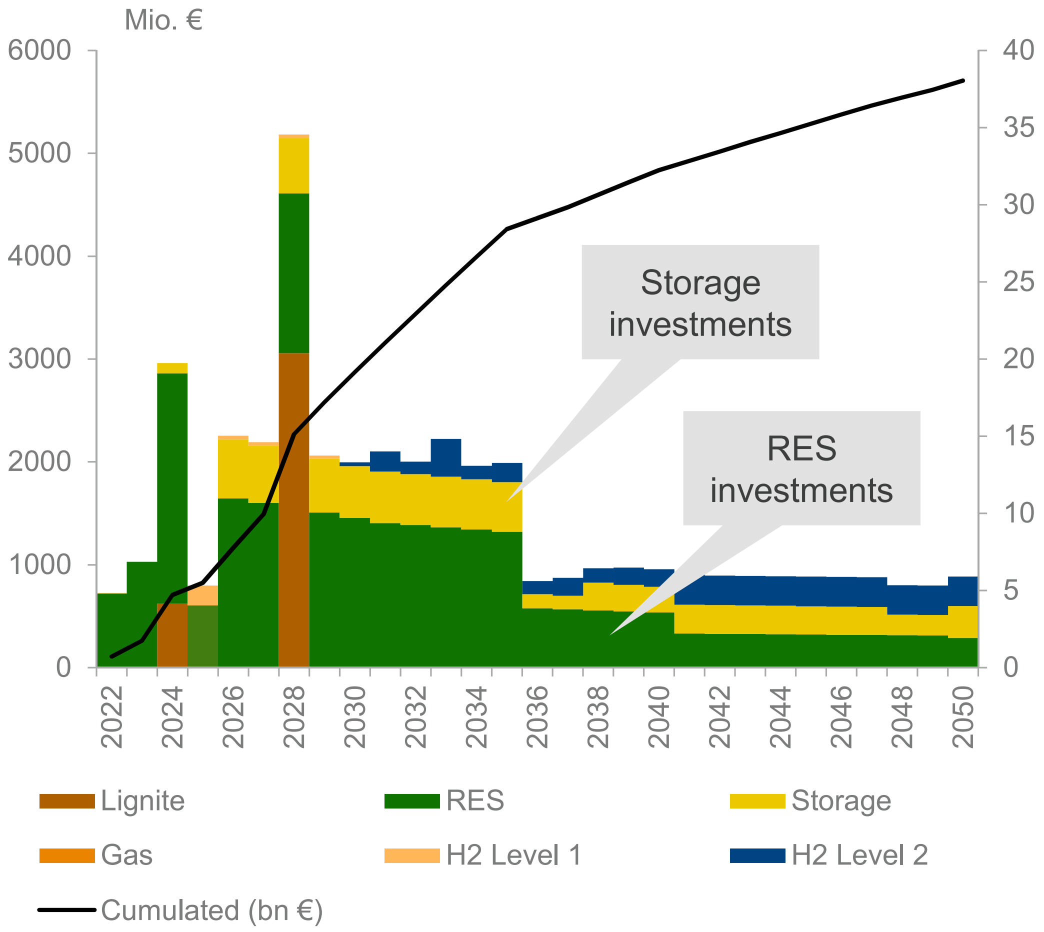


RES capacity expansion & respective investments into the power sector transition concentrate within the next 1.5 decades

Capacities in Smart transition sc.



Investments in Smart transition sc.



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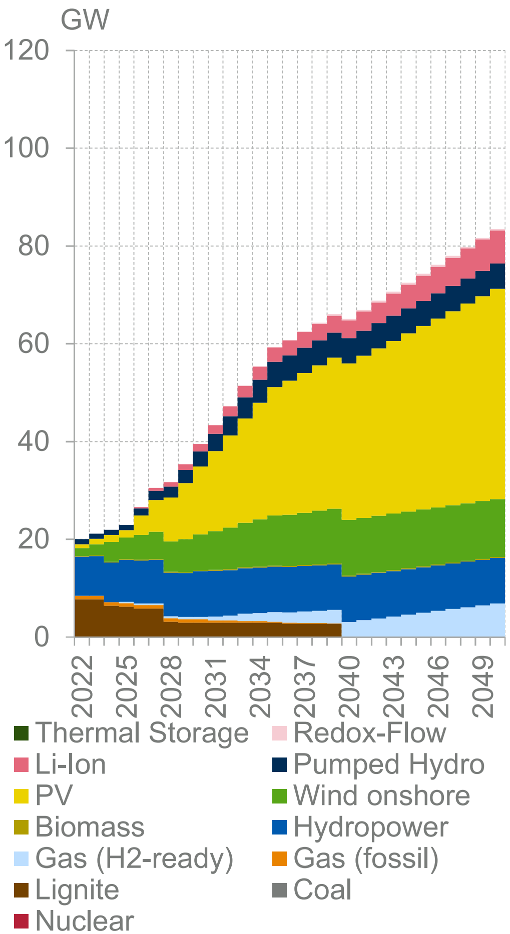
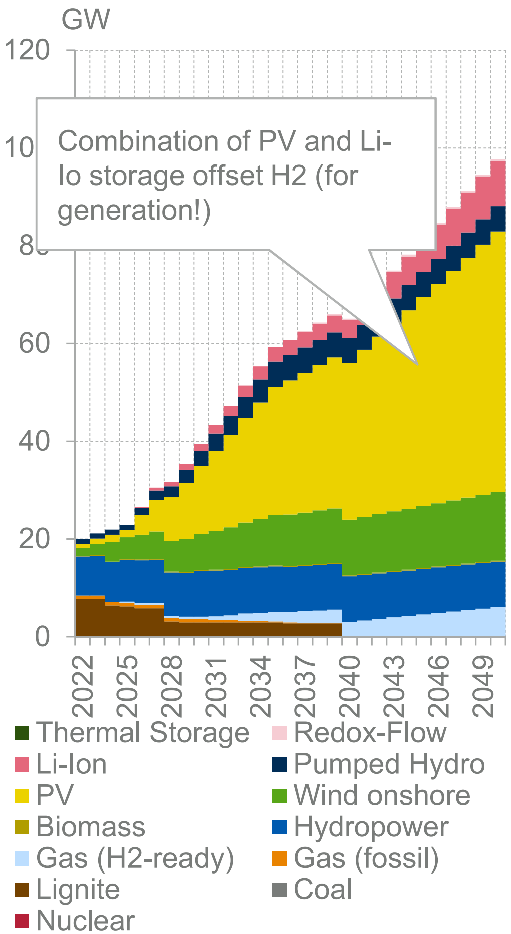
WB-6: capacities in smart transition scenarios

With higher H2 costs, a combination of PV and Li-Ion battery capacities is efficient to substitute H2-generation. Cheaper and longer-term Redox flow batteries reduce overall capacity demand. In a thermal storage cost breakthrough scenario, 0.7 GW thermal storage can replace 1.4 GW Li-Io batteries.

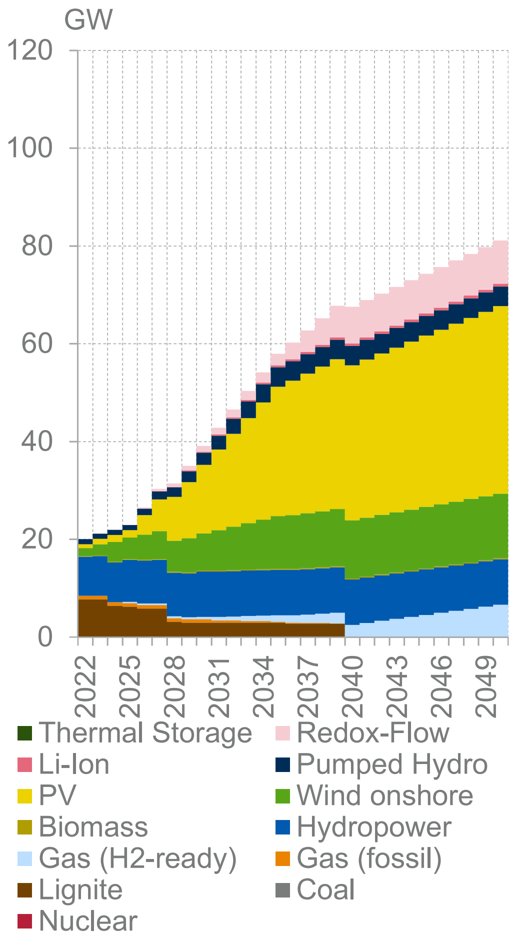
Smart Transition Core



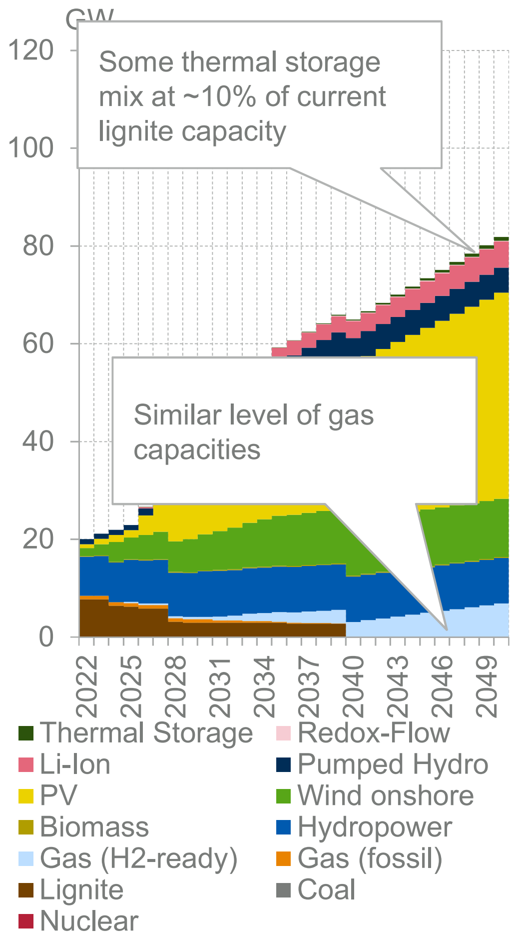
H2 costs increase



redox-flow breakthrough



thermal storage breakthrough



Core/S1: core policy scenarios, S2: H2 costs, S3: redox-flow battery breakthrough, S4: thermal storage breakthrough

Conclusions for WB-6 region – I

Power market decarbonisation by 2045 is possible and cost efficient	• A decarbonisation of the power sector by 2045 is possible while saving costs. The energy transition scenarios cut cumulated CO2 emissions by half (46-51%) while reducing overall generation costs by ~3-15% (compared to the baseline scenario). Security of supply is ensured in the energy transition scenarios.
Vast amounts of RES are required for the transition	• Installations of wind onshore and PV, today combined at below 5 GW in the region, will provide the majority of electricity in a net-zero scenario in the mid and long run, balanced with storage solutions • Combined capacity of onshore wind and PV will have to increase more than tenfold
Storage technologies provide flexibility & scalability	• Li-Ion batteries and, where available, pumped storage is deployed in the smart in transition scenario, helping to increase cost efficiency. Storage also helps to switch the RES mix from wind to more easily scalable PV. Further sensitivities demonstrate, that thermal storage at lignite sites as well as redox flow batteries can reach an energy economic breakthrough.

Conclusions for WB-6 region – II

Fossil gas is a dead end	• Baseline and gas lock-in invest heavily into natural gas, which proves as a dead end in the long-term, leading to overall higher costs. If investments are executed hydrogen-ready and efficient storage technologies are deployed, cumulated gas demand can be reduced by 50% while reducing overall costs by 12% (smart transition vs. gas lock-in)
Hydrogen as decarbonisation enabler with low volumes	• Long-term storage is a necessary enabler of deep decarbonisation and to ensure security of supply. Based on the current technological outlook, hydrogen is of key importance here. Combined H2 capacities of the region range in between ~5-9 GW in the energy transition scenarios. Its role in regards to volumes should not be overstated though: generation shares on demand are limited to ~7-10% (2045-2050) of demand.

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