

# The effect of the revitalization of Mátra Power Plant on the power sector

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*A.4 Preparation of an impact assessment for the electricity and heating sector*

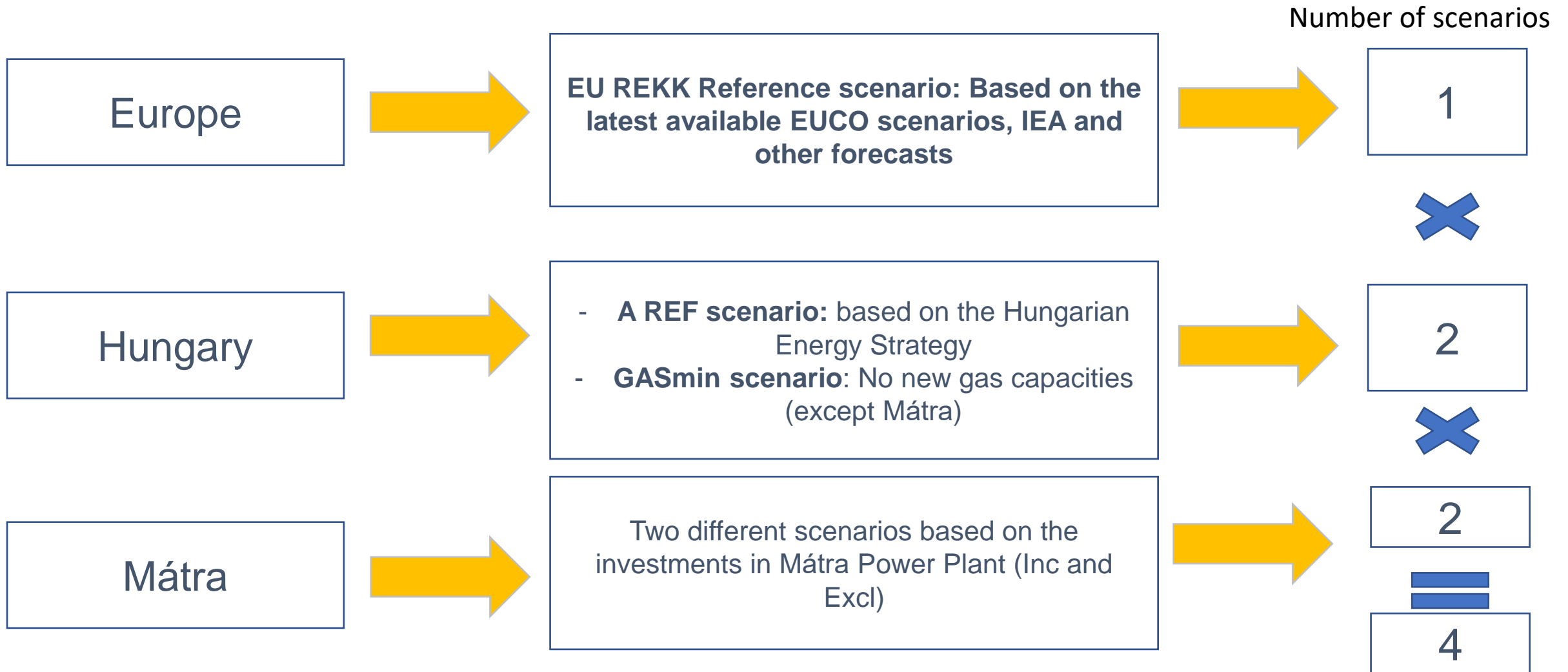
*REKK*

*2022.05.26.*

# Aim of the research

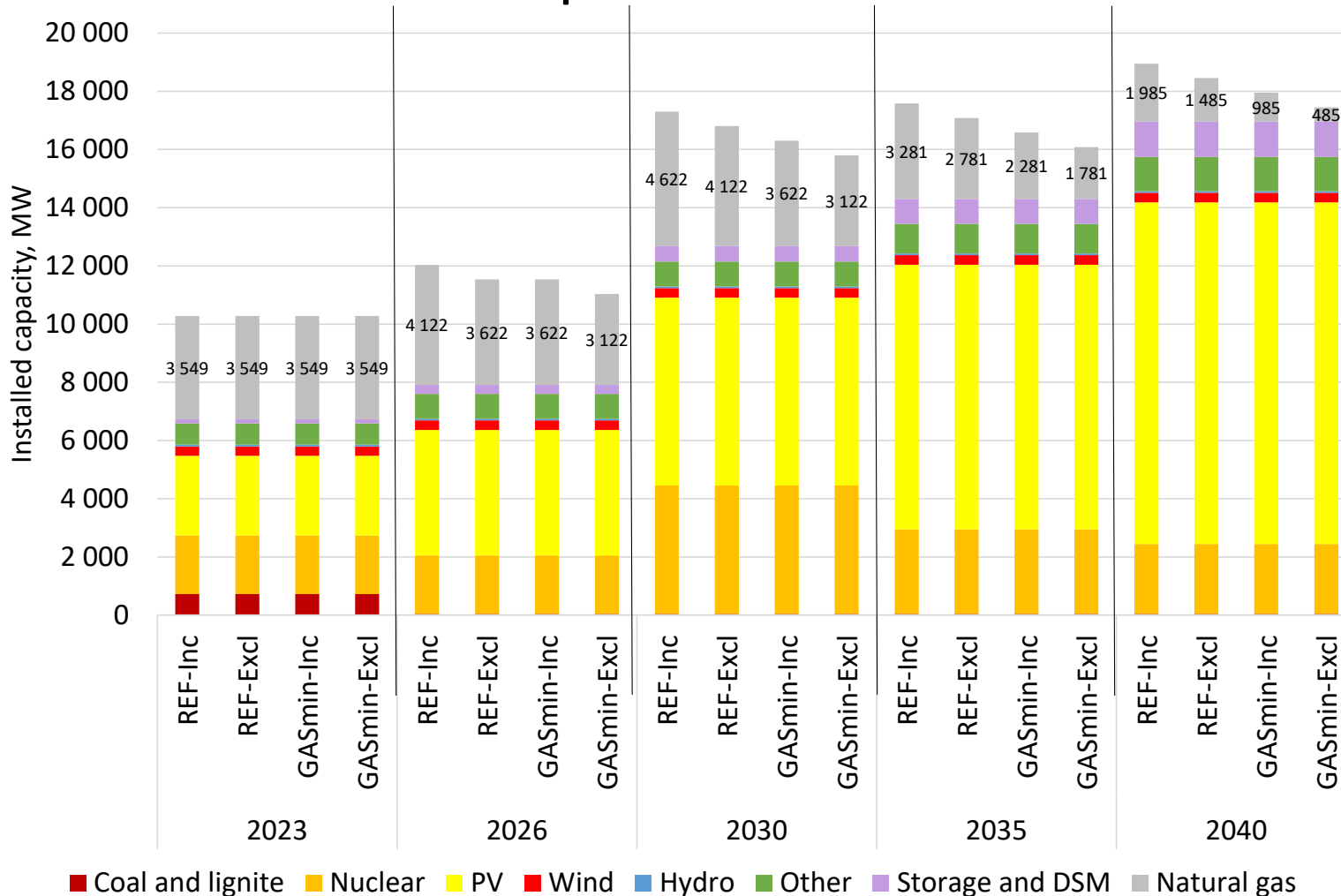
- The present study focuses on two important areas.
  - Assessment the impact of the closure of the lignite units of the Mátra Power Plant and the entry of possible new generation capacities into the Hungarian electricity market
    - wholesale prices
    - security of supply
    - Electricity mix
    - CO2 emission
  - The profitability of the various developments of Mátra Power Plant and the impact of other potentially realized natural gas-fired power plant investments
- The study is performed using a 168 hour time horizon unit commitment and economic dispatch electricity market model (EPMM) developed by REKK and covering the entire electricity system of 40 European countries, simulating different scenarios and development directions
- The modelling was carried out before the UA-RU war, and the high electricity price environment:
  - Scenario set-up: Beginning of 2021
  - First results: June 2021
  - Final results: end of 2021

# Scenario set-up



Modeled years:  
2023; 2026; 2030; 2035; 2040

# Installed capacities



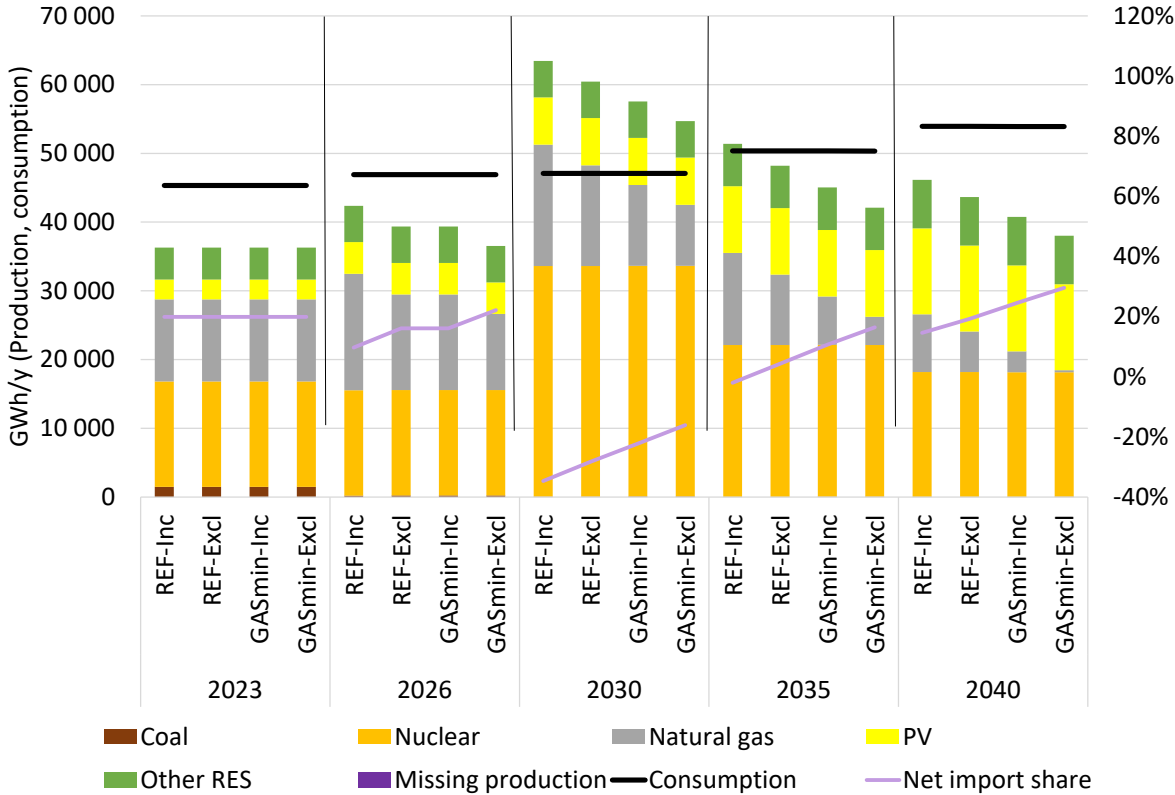
- A REF-Inc scenario is in line with the Hungarian National Energy Strategy
- In the GASmin scenarios no new gas-based investment is assumed (except in the GASmin-Inc, where the new CCGT in Mátra is assumed)
- Except the gas-based generation capacities, all the assumed installed capacities are the same for all scenarios

- REF-Inc: three new CCGT blocks, including the Mátra CCGT (+1500 MW)
- REF-Excl: two new CCGT blocks, no new CCGT in Mátra (+1000MW)
- GASmin-Inc: Only new CCGT in Mátra (+500 MW)
- GASmin-Excl: No new CCGT capacities at all (+0 MW)

# Main input parameters and sensitivities

- Gas price: From 2025 ~15 €/MWh based on European Gas Market Model
- CO<sub>2</sub> price: For 2030 42€/t by 2040 ~80 €/t based on the Impact Assessment of the European Commission (September 2020)
- Coal price: 2.4 €/GJ by 2030 based on the IEA (International Energy Agency) World Energy Outlook 2020 Stated Policy scenario.
- Domestic electricity consumption: Between 2022 and 2025 1.8 %, between 2025 and 2030 0.1%, and between 2030-2040 1.4 % consumption growth based on PRIMES 2020 Reference scenario
- Reserve requirement: In order to forecast the reserve needs we used a regression model based on fact data from 5 years and 16 countries. Based on this regression the reserve requirement is determined by two factors: weekly average load and installed capacities of variable (PV and wind) RES capacities. The regression results shows that increasing PV capacities by 1000 MW, it increases the reserve capacities by 11-16 MW
- Eight sensitivity tests were performed for all four scenarios:
  - a. The 70% rule has no effect on the amount of free cross-border capacity available to traders
  - b. Low electricity demand
  - c. High electricity demand
  - d. High ETS price
  - e. N-1 evaluation
  - f. High reserve requirements
  - g. High PV penetration
  - h. High natural gas price

# Effect on electricity mix and wholesale prices

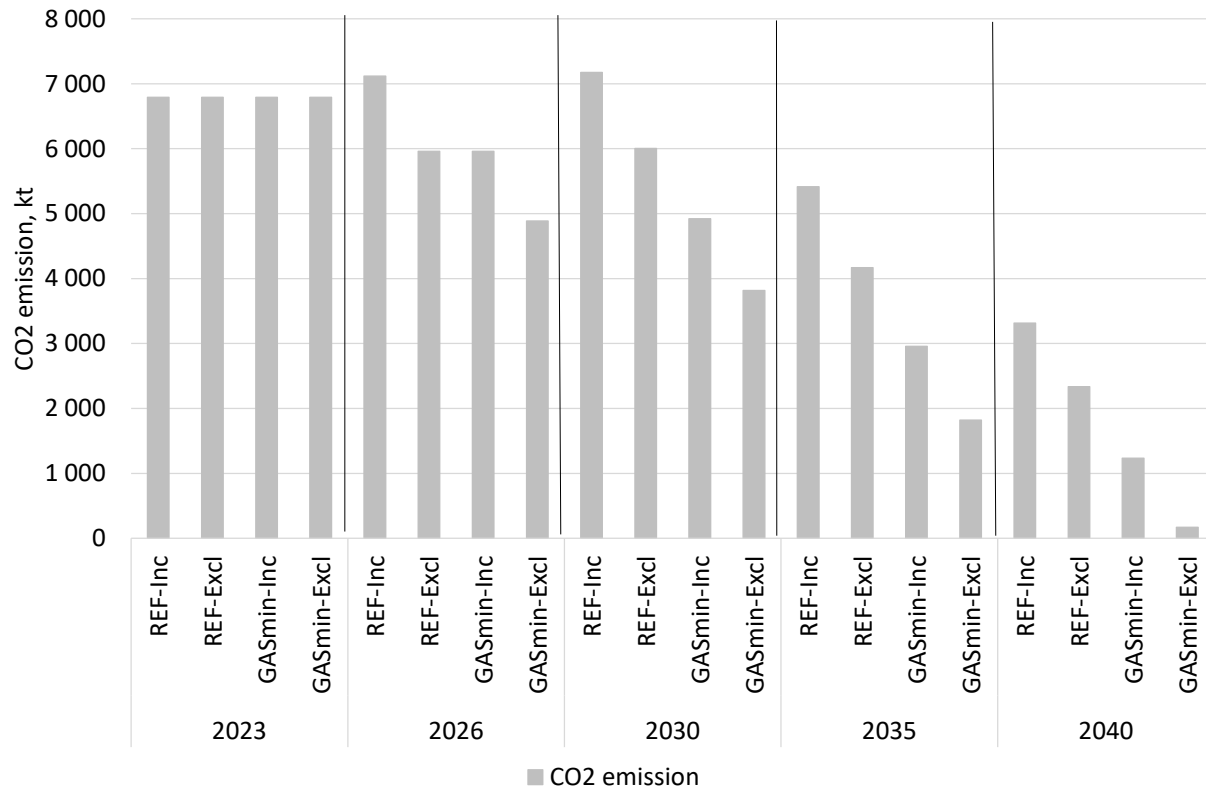


- The CCGT development in Mátra will increase electricity production in Hungary -> reducing the net import ratio. This effect will be smaller in 2040 than around 2030.
- In 2035 the gas expansion of the Mátra Power Plant will reduce net imports by 6.3 percentage points in the REF scenario and by 5.8 percentage points in the case of GASmin
- In 2040 in the same cases this effect will be only 5.1 percentage points and 4.6 percentage points.

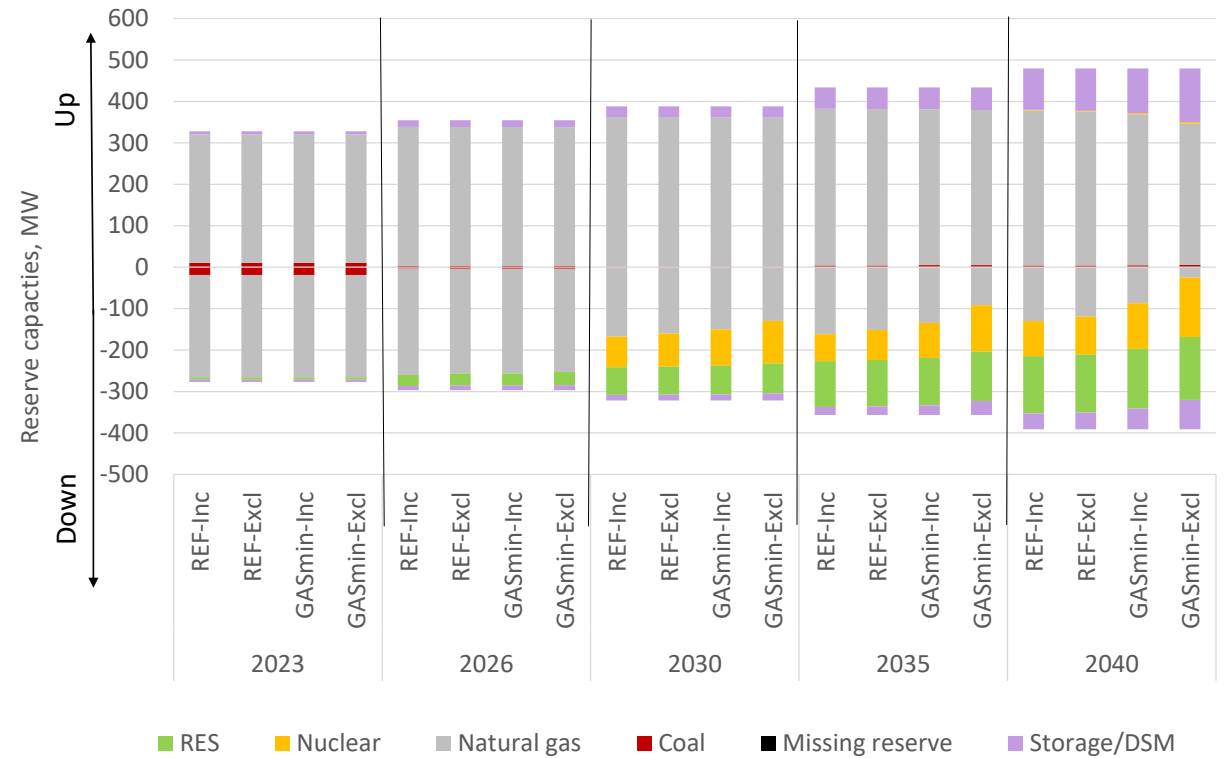
€/MWh		2026	2030	2035	2040
REF	Inc	57.28	56.84	63.58	65.45
	Excl	57.63	57.12	64.01	65.98
	Differencia	-0.35	-0.28	-0.43	-0.54
GASmin	Inc	57.63	57.27	64.42	66.50
	Excl	57.83	57.45	64.66	67.05
	Differencia	-0.20	-0.19	-0.25	-0.54

- New CCGT in Mátra has only a small impact on the domestic wholesale electricity price.
- The CCGT investment in Mátra reduces prices by 0.19 to 0.54 EUR / MWh, depending on the scenario and the year under review.

# Effect on CO2 emission and reserve mix



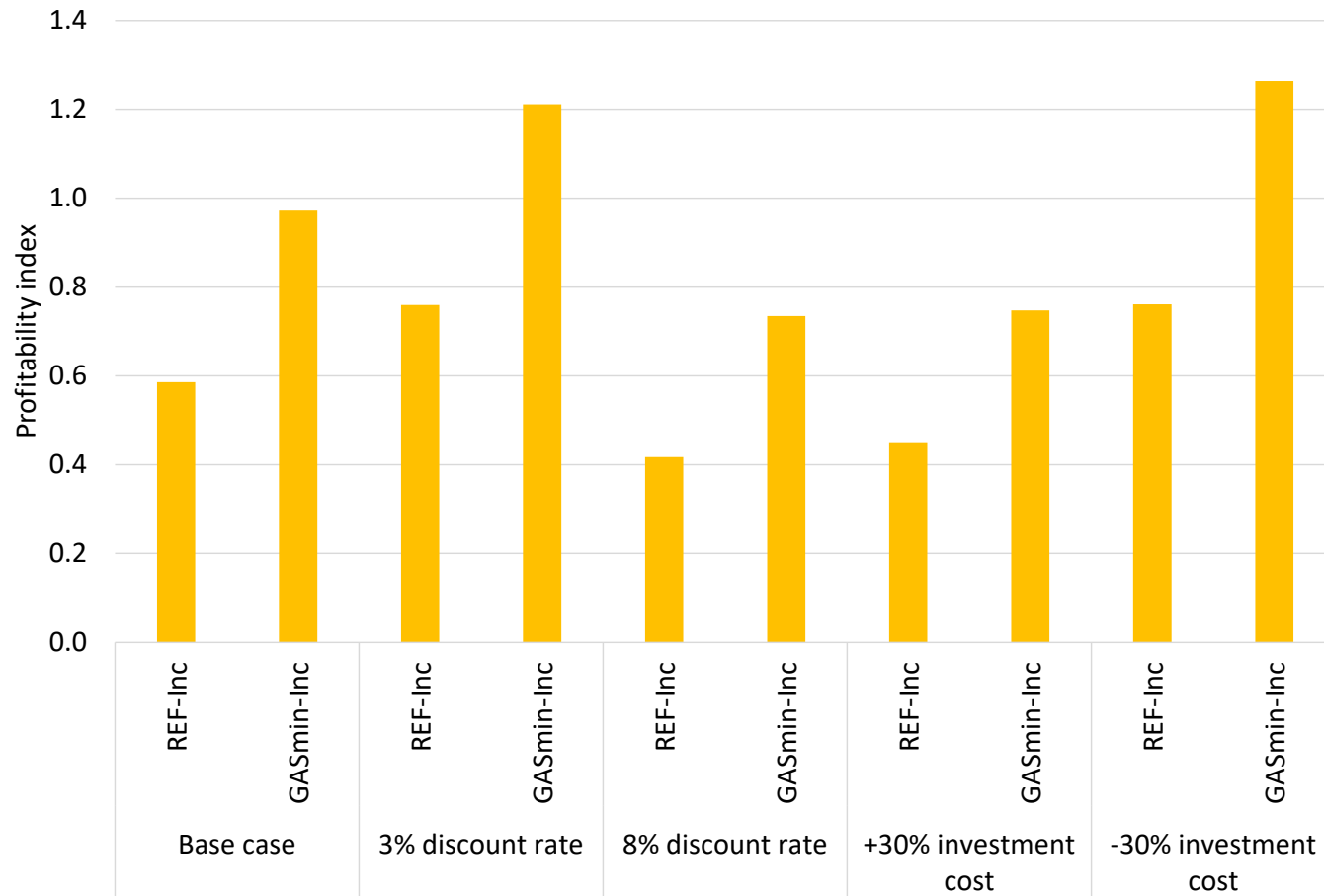
The construction of the Mátra CCGT will result in an increase in CO2 emissions of approximately 1 million tones each year and scenario, assuming that lignite-based electricity generation is already phased out, compared to the case if no new gas unit is built.



In each of the scenarios examined, sufficient regulatory reserve capacity is available in all scenarios (REF-Excl, REF, Inc, GASmin-Excl and GASmin-Inc) so that no security of supply risk can be identified



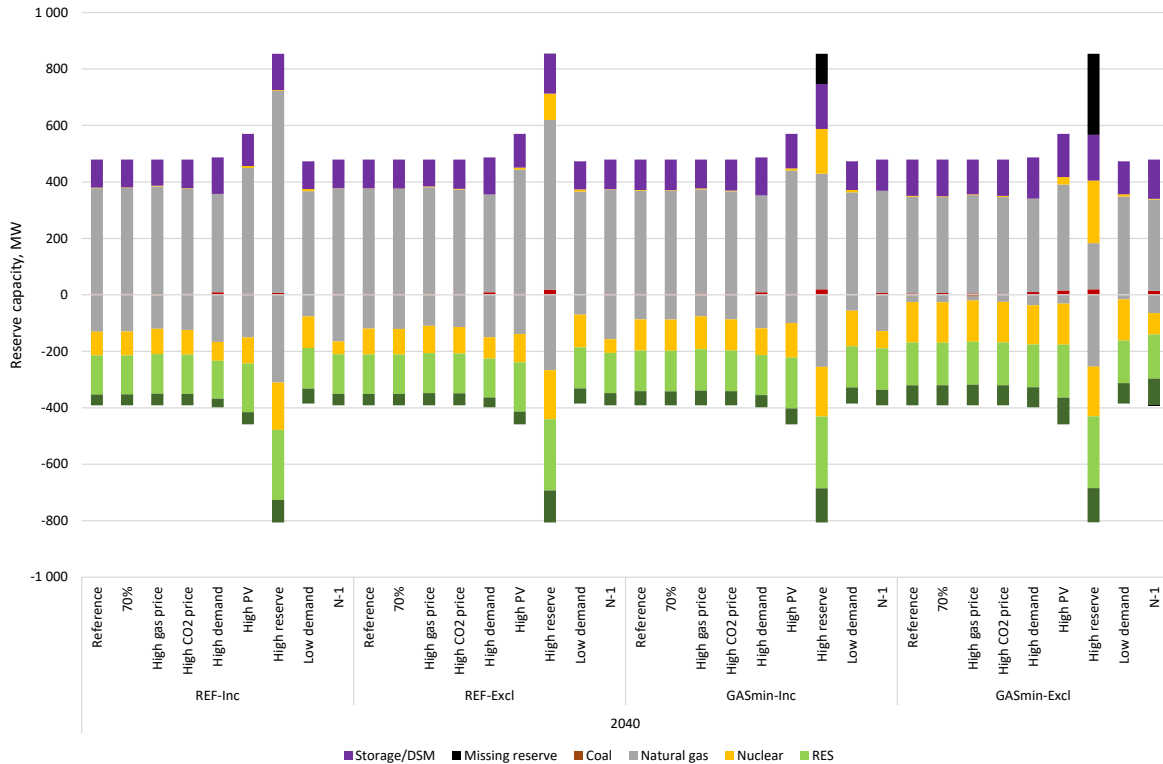
# Effect on profitability of the new CCGT in Mátra



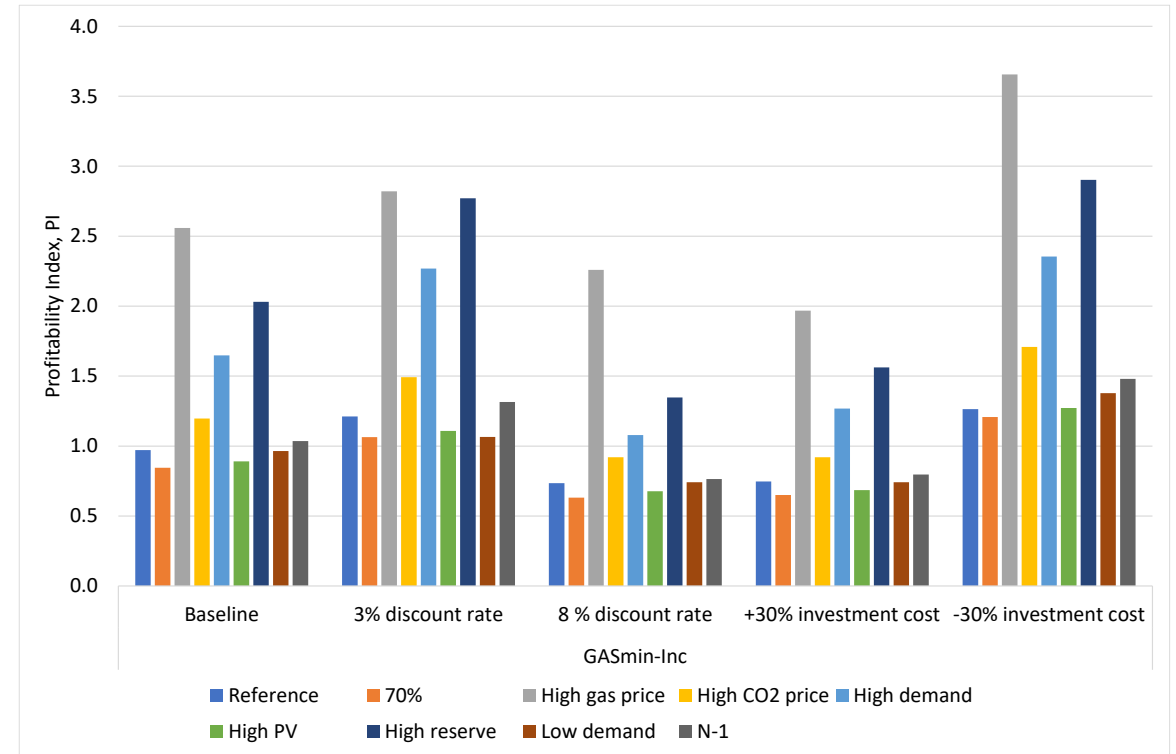
- The return on the CCGT development of the Mátra Power Plant is clearly negative if other CCGT power plants are also built in Hungary.
- In contrast, if there is no investment other than the Mátra, it is very close to return (especially if low discount rate or low investment cost is assumed)



# Main results of the sensitivity runs



- In 2040 in high reserve requirement scenario, there is insufficient balancing capacity.
- However, a relatively pessimistic storage capacity is assumed, with 200 MW by 2040 in each scenario.
- During the high reserve sensitivity analysis, GasMin-Inc lacks an average of 108 MW of upstream reserve capacity, while in the GasMin-Excl scenario, this value is already 287 MW.
- We do not see any shortage in the other sensitivity tests.



- High gas prices, high demand and high reserve requirements create particularly favourable conditions for the return on the Mátra CCGT project
- Higher CO2 prices also help to recoup the project - in essence, higher electricity prices are needed to make the project positive.

# Thank you for your attention!

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