



GREEN ENERGY SCENARIOS FOR HUNGARY

RESULTS OF ENERGIAKLUB & WUPPERTAL
INSTITUT'S ENERGY MODELLING

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ENERGIAKLUB
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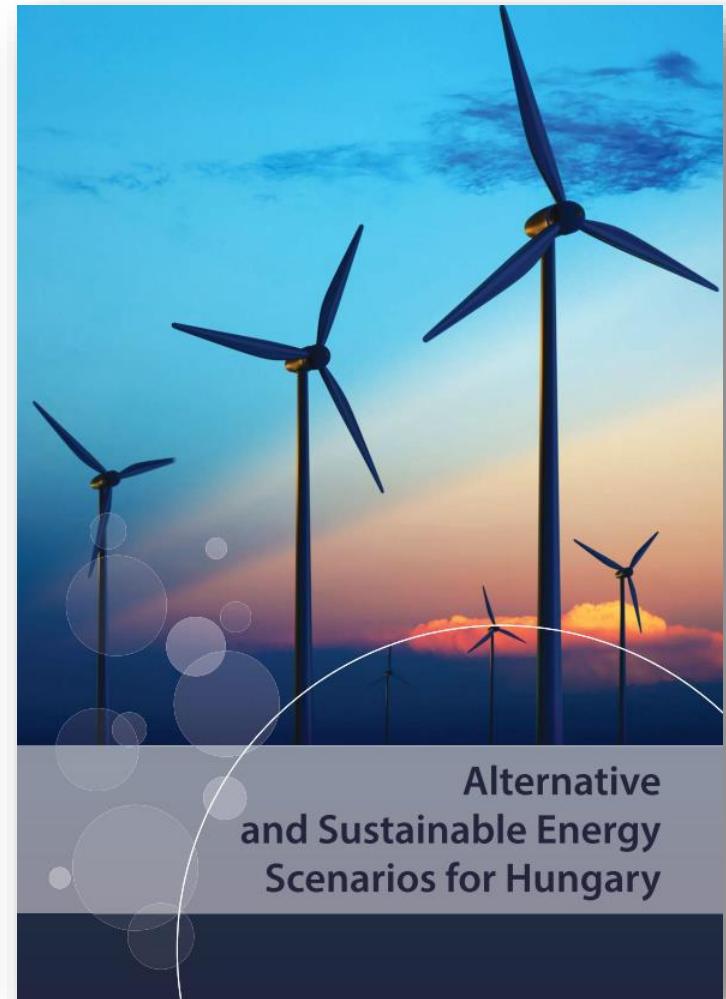


Wuppertal Institut

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- Magdolna Prantner
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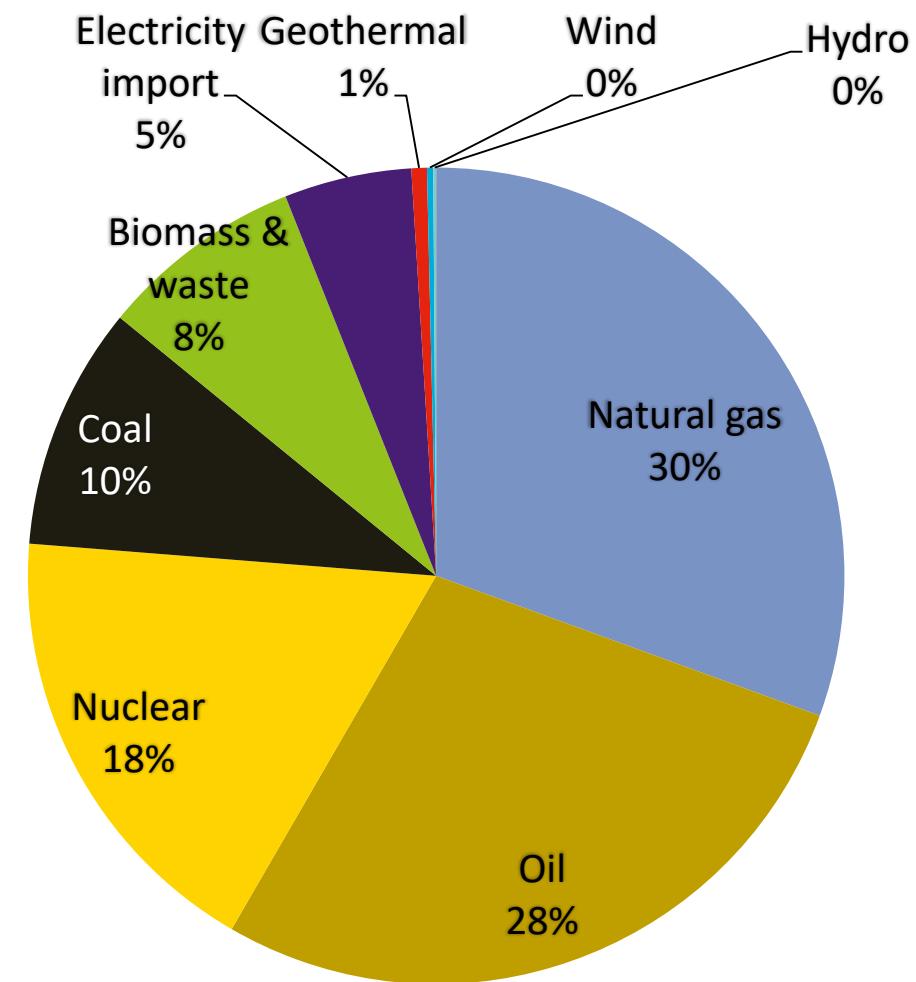
[http://fenntarthatoenergia.hu/
executive-summary](http://fenntarthatoenergia.hu/executive-summary) (ENG)



ENERGY POLICY IN HUNGARY

ENERGY MIX

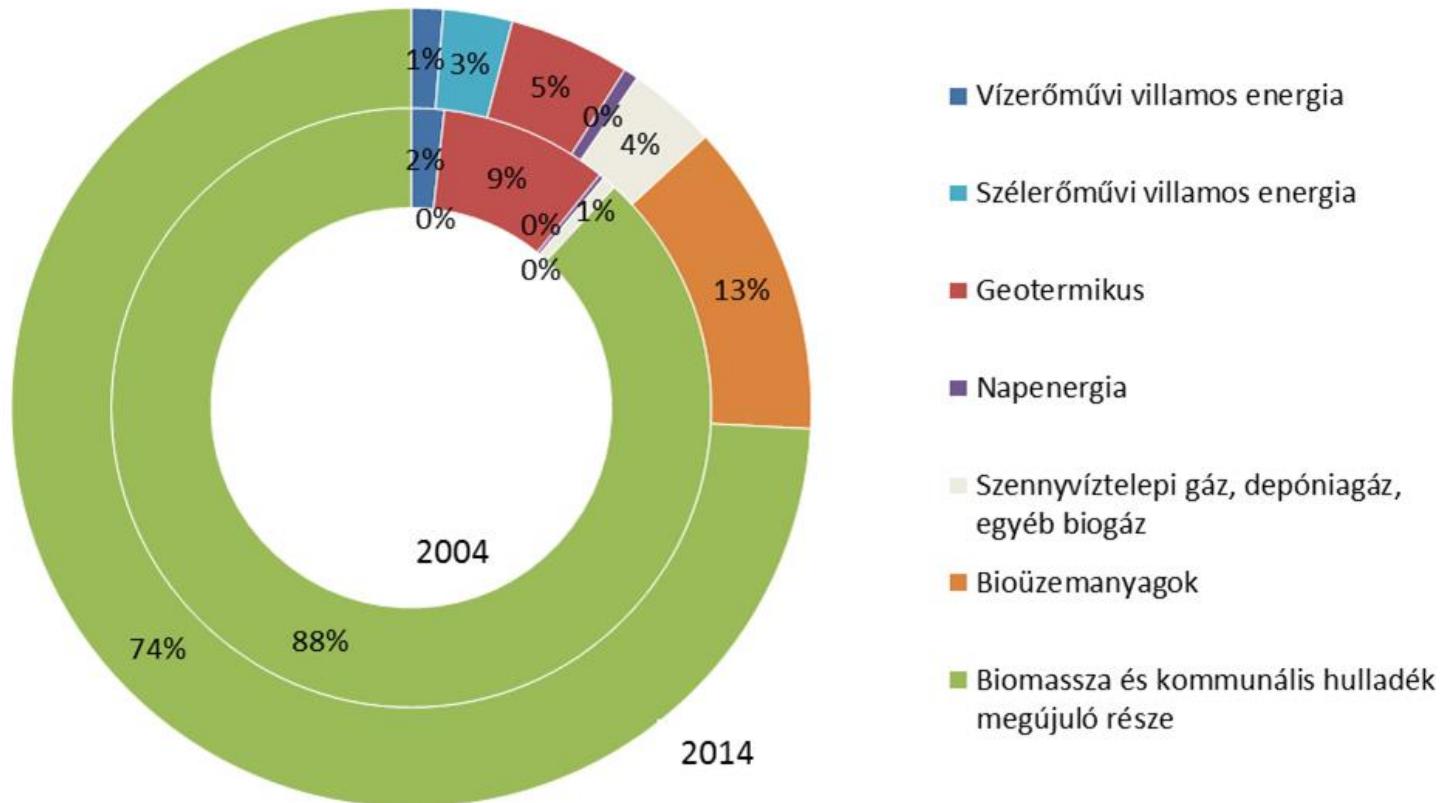
- Energy dependency: 62%
(Gas: 98%)
- Share of renewables in gross final energy consumption:
HU: 9,5%
EU: 16%



Primary energy consumption 2014



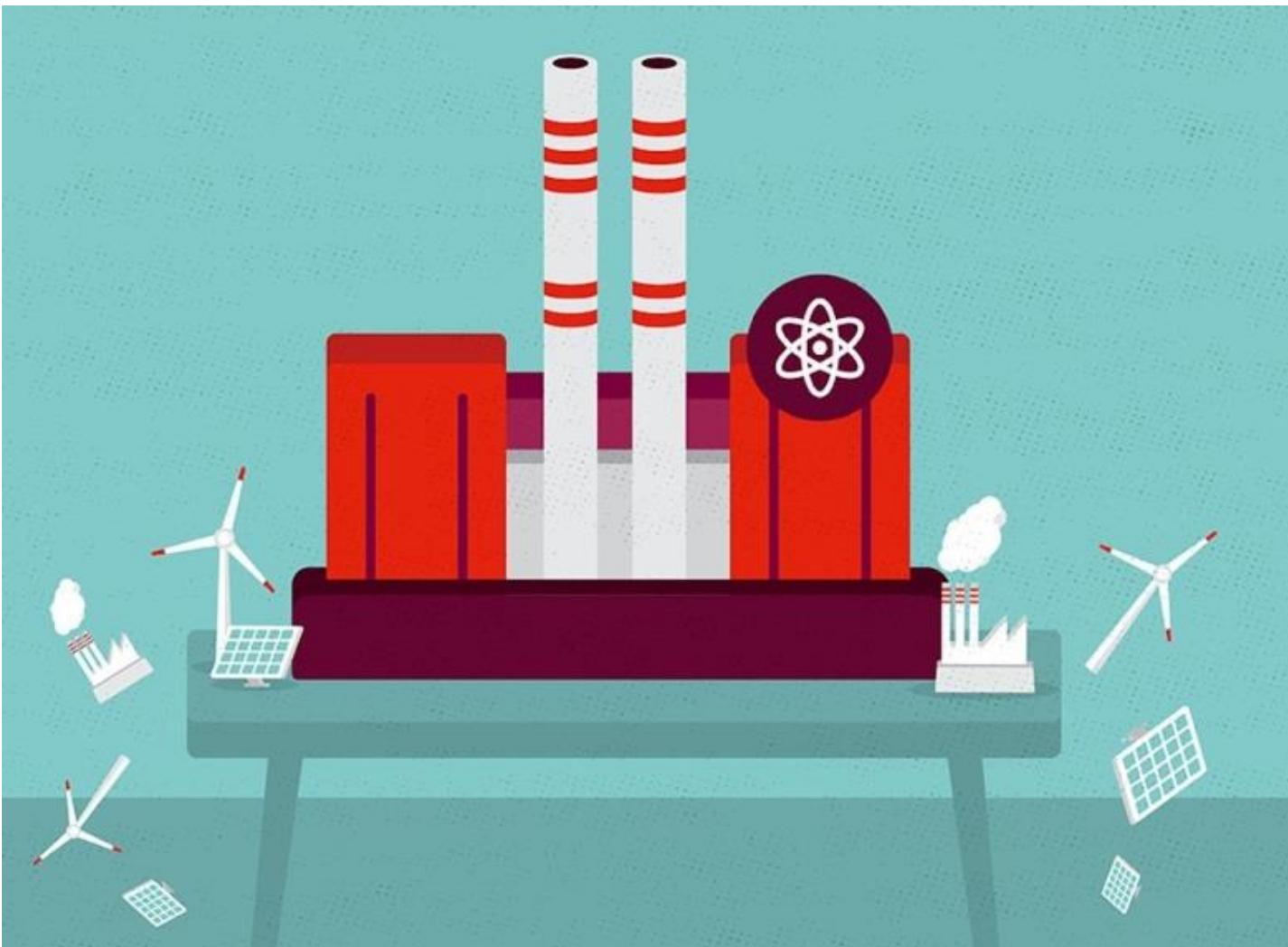
RENEWABLE ENERGY USE

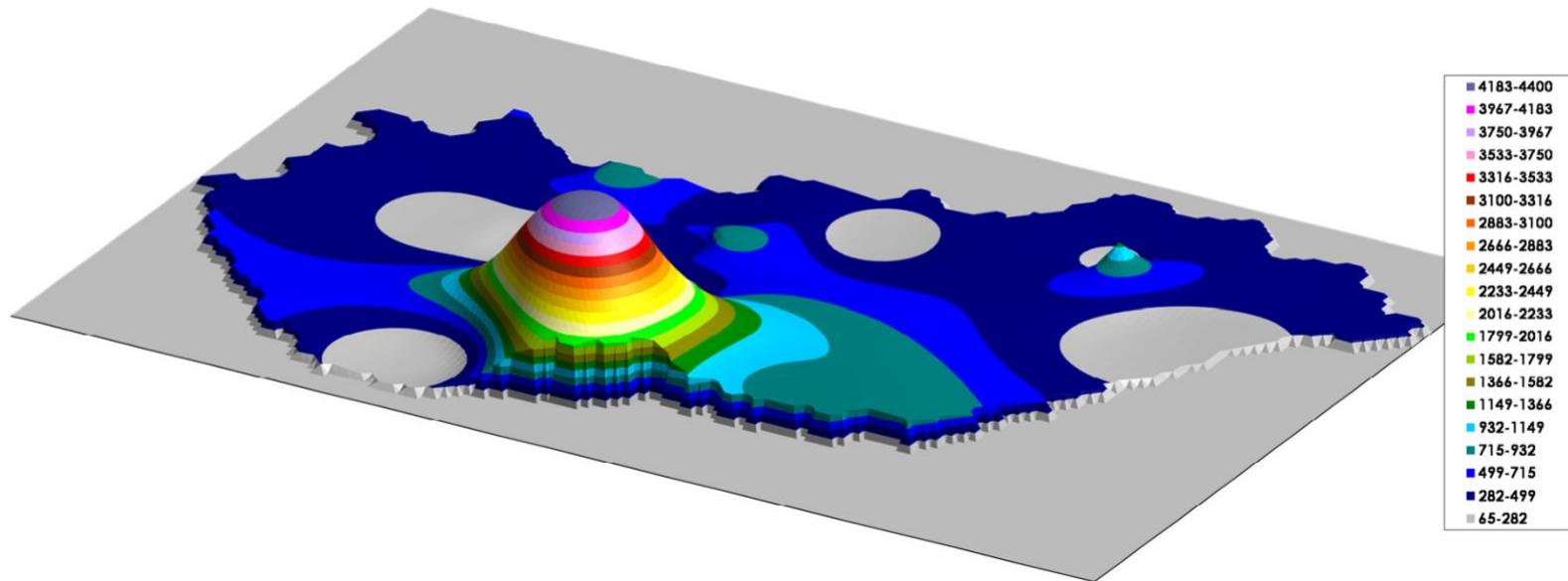


Data: Hungarian Statistical Office 2015



ENERGY POLICY OF THE HUNGARIAN GOVERNMENT





Hungarian power capacities
(2030, MW)



ABOUT OUR RESEARCH



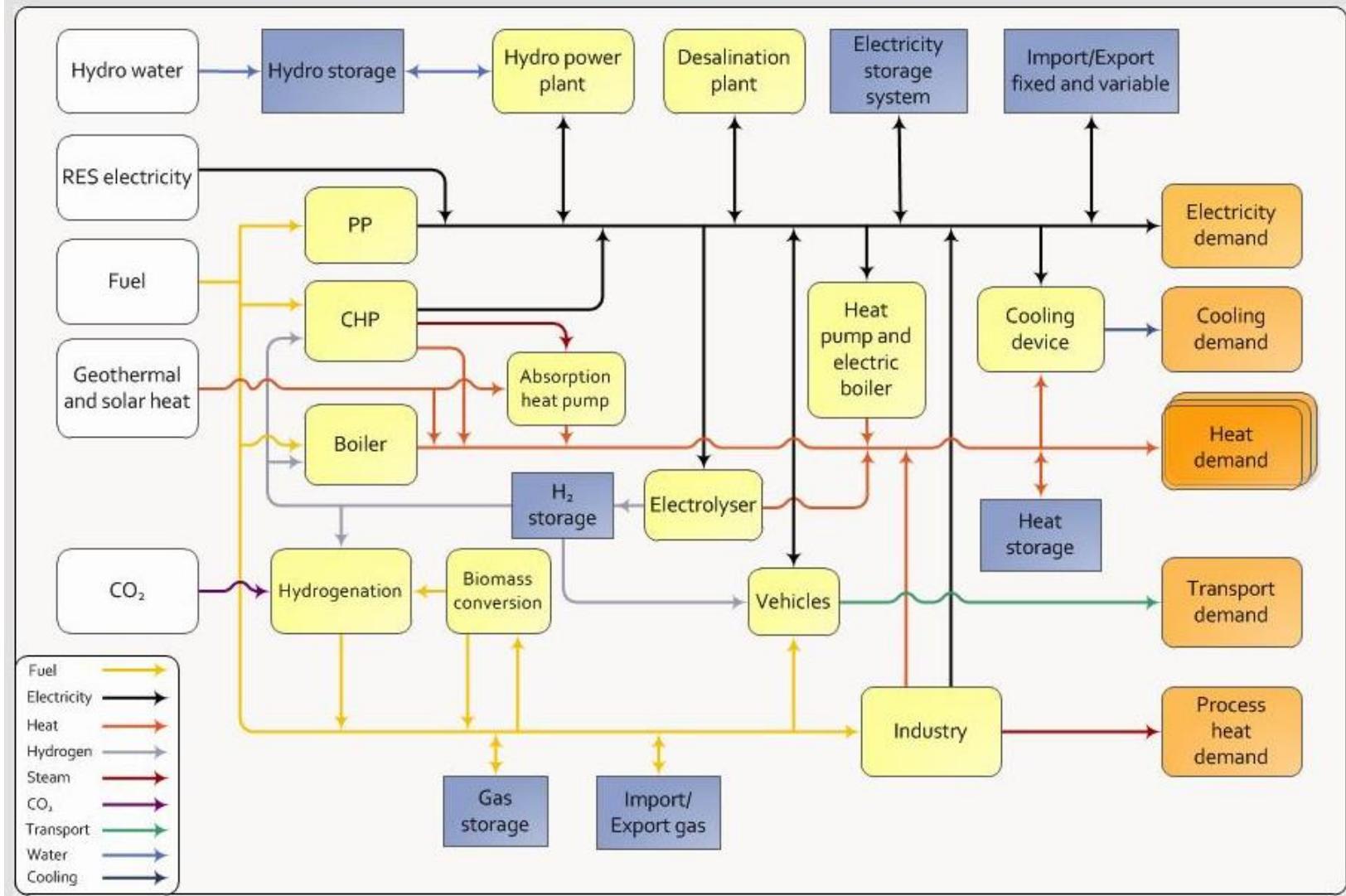
Combination of different bottom-up models:

- Final energy consumption of the industry and tertiary sectors: WI's **WISEE model**
- Residential heat demand: Energiaklub's NegaJoule model
- Transportation sector: model of Energiaklub & the Technical University of Budapest
- Electricity and heat, balance of production and consumption: **EnergyPLAN**
 - Analyzes the entire energy system in hourly resolution for a year (balance of dem. and supply)
 - Weather dependence of renewables appears

EnergyPLAN

Energy System Analysis Tool

Version 12.3 25 June 2015





- 4 scenarios: NUCLEAR, GREEN, INTER-A, INTER-B
- The same socio-economic parameters, e.g.:
 - Population: 9,7 (2030) and 9,17 (2050) million
 - GDP: 127 (2030) and 152 (2050) billion EUR
- Different assumptions regarding energy efficiency, renewable energy use and trends in transportation
- New NPP only the „nuclear” scenario



business-as-usual

- Based on the EU Reference Scenario (EC 2013) & the National Energy Strategy
- Paks II Nuclear Power Plant



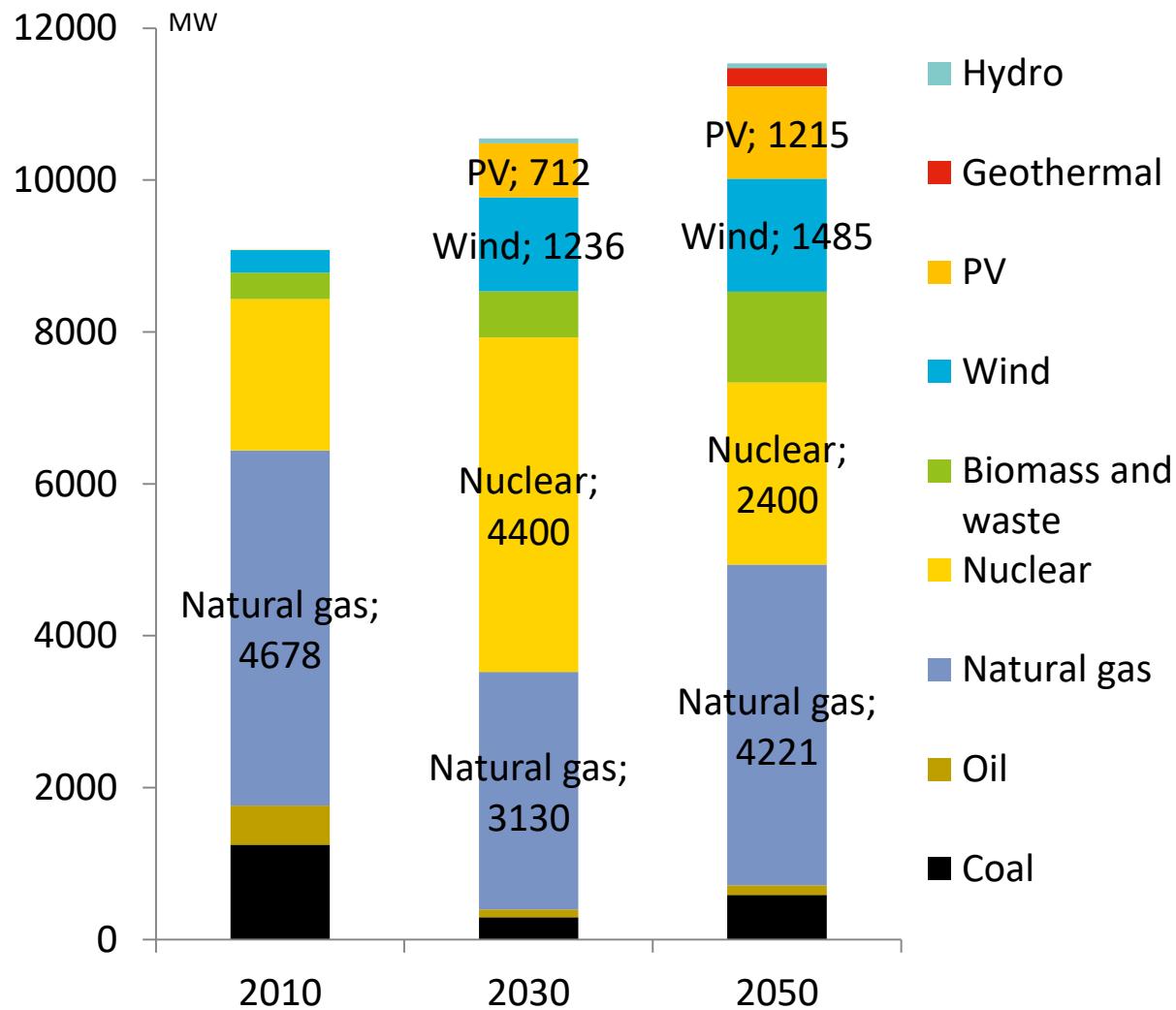


NUCLEAR SCENARIO

Demand / final energy use is increasing

No significant improvement in efficiency

RES in power generation: 13%
(2030), 24%
(2050)





No new NPP

Focus on energy efficiency and renewable power production

Decrease of energy consumption in all sectors



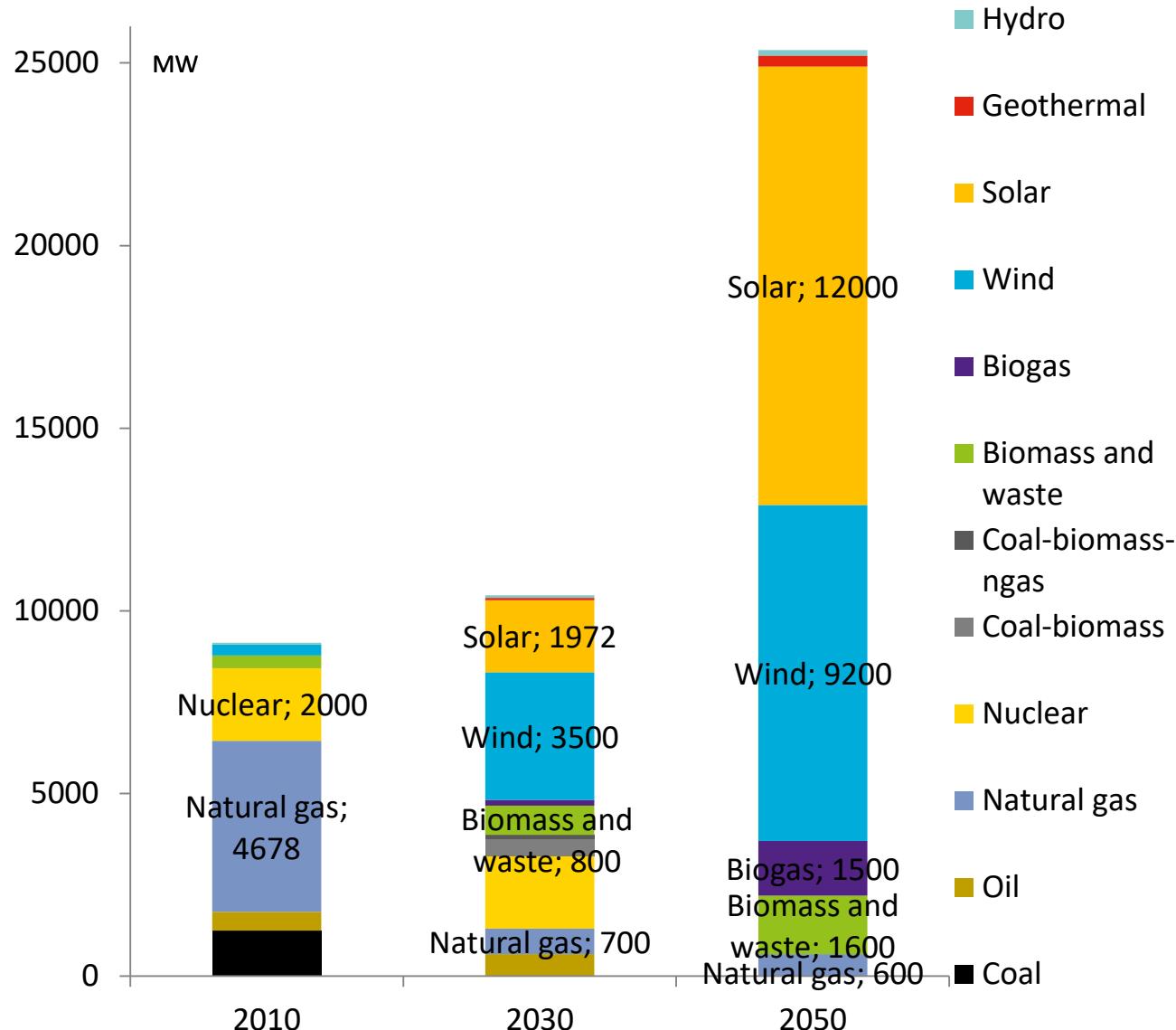


GREEN SCENARIO

Building
refurbishment:
50000
households/year

Moderate increase
in the number of
cars to 3 million &
15% decrease in
consumption

Electric
transport:
50% of cars (2050)





- Consumption level as in the 'Nuclear' scenario
- Renewables instead of nuclear energy





Renewables instead of nuclear energy + energy efficiency

Decrease in consumption in all sectors

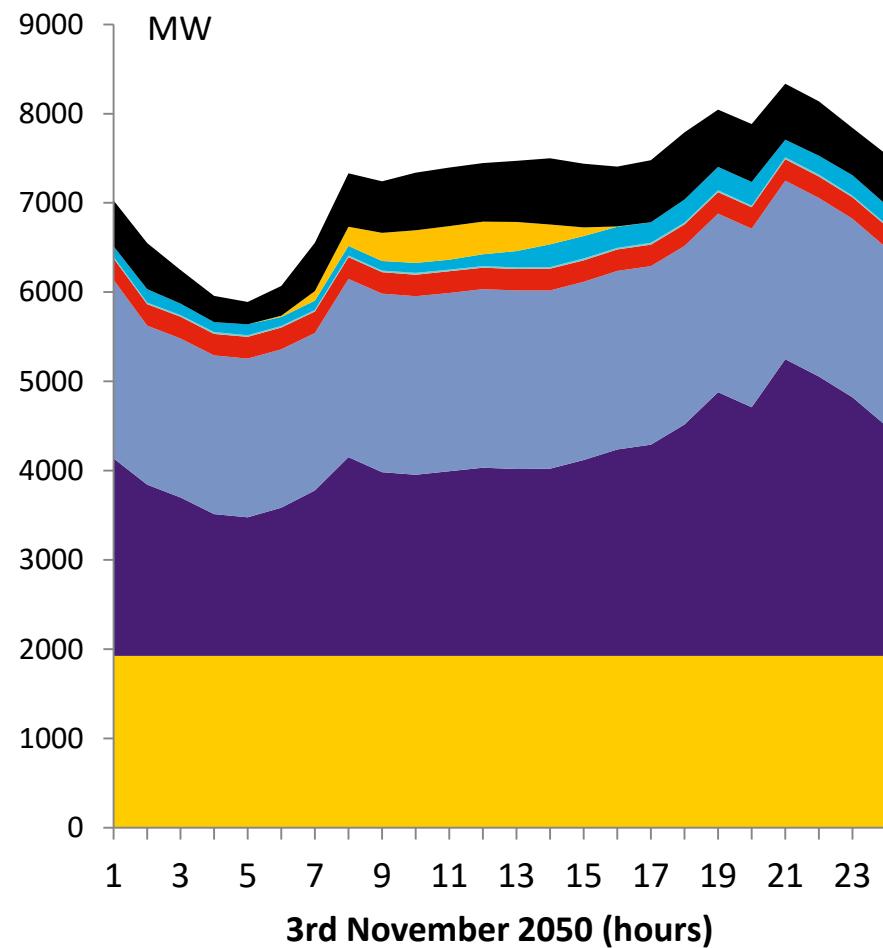
- A moderate improvement in energy efficiency compared to the GREEN scenario



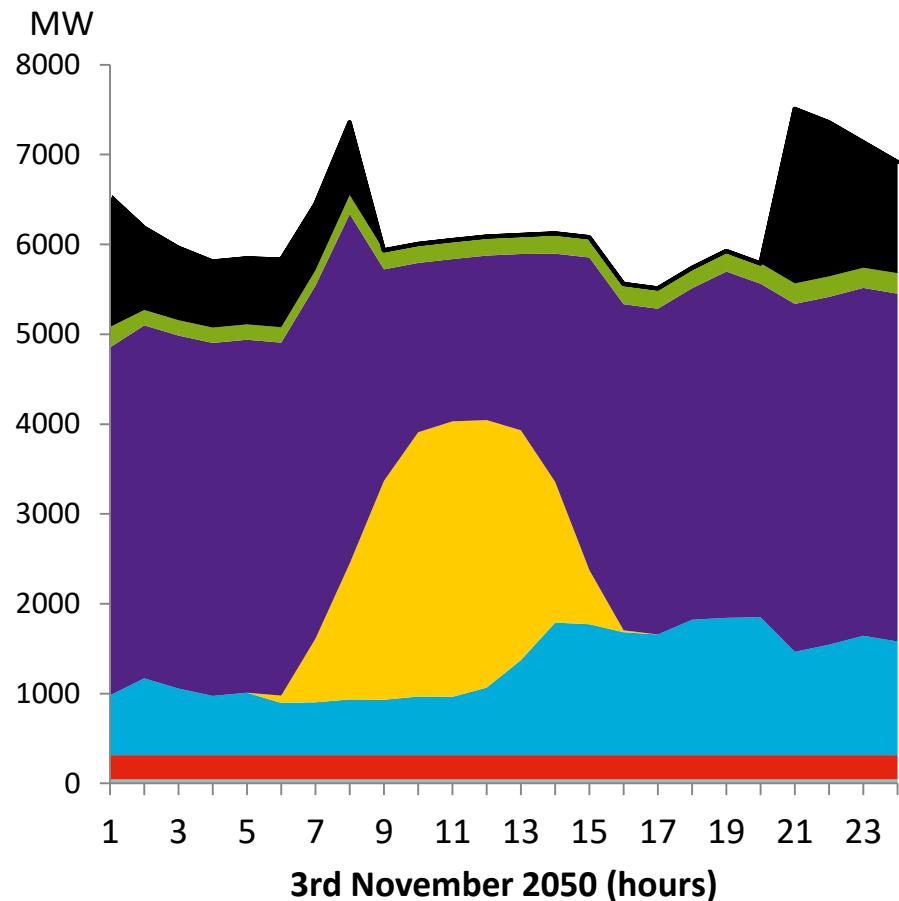


ELECTRICITY PRODUCTION

NOV 3, 2050



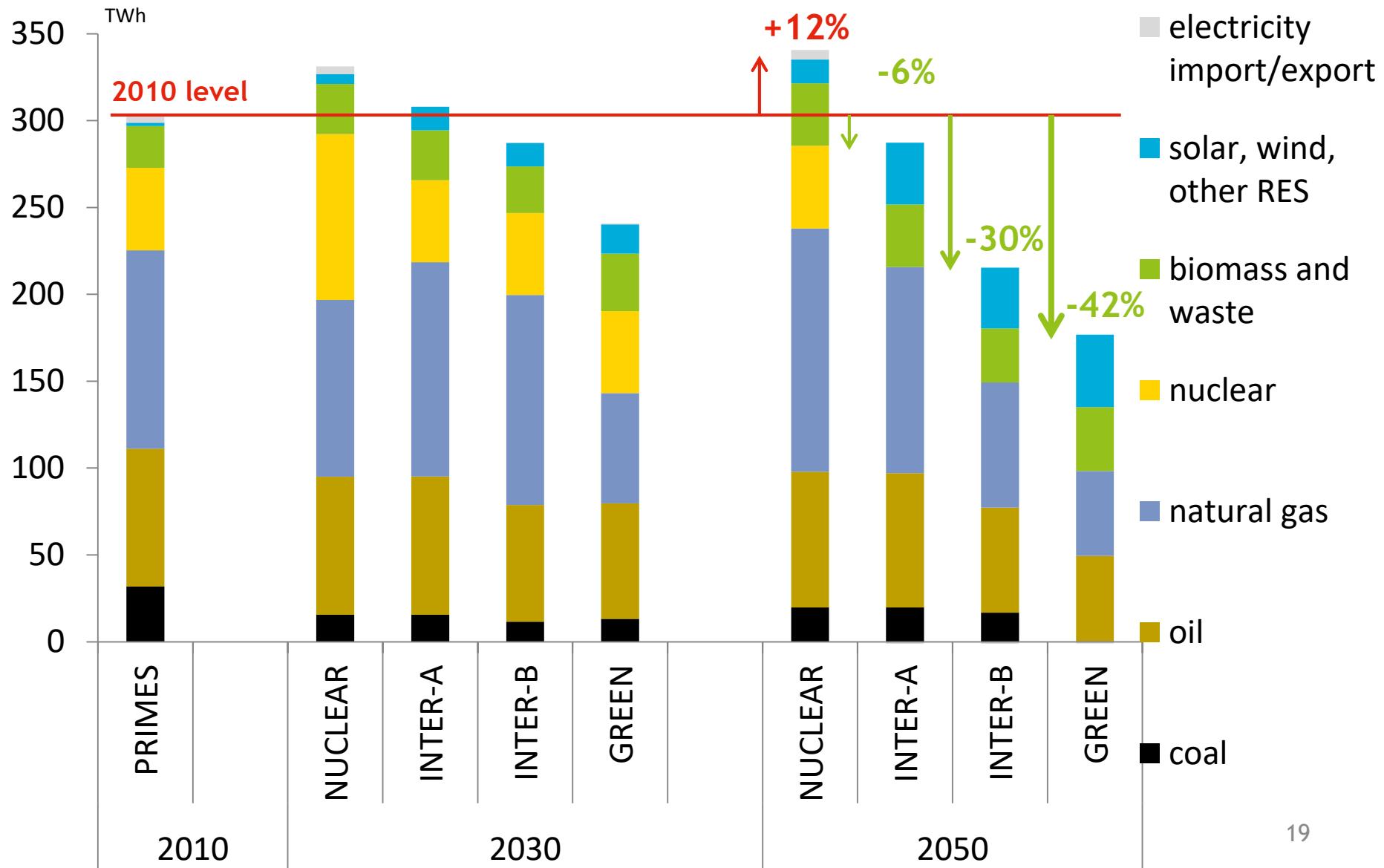
- nuclear
- CHP
- hydro
- PV
- conventional PP
- geothermal
- wind
- import



- import
- biomass CHP
- biomass, natural gas, biogas
- PV
- wind
- geothermal

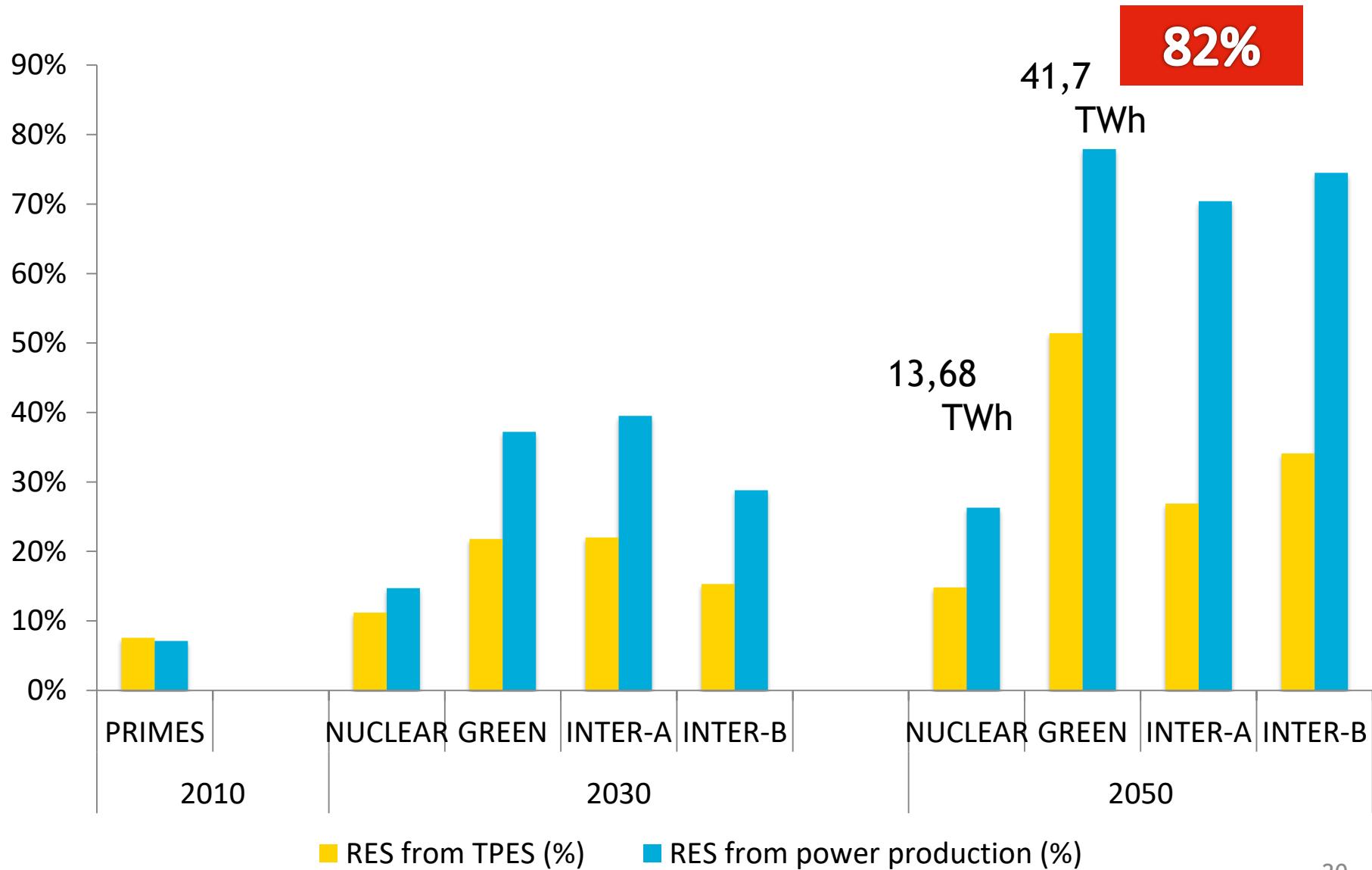


TOTAL PRIMARY ENERGY CONSUMPTION



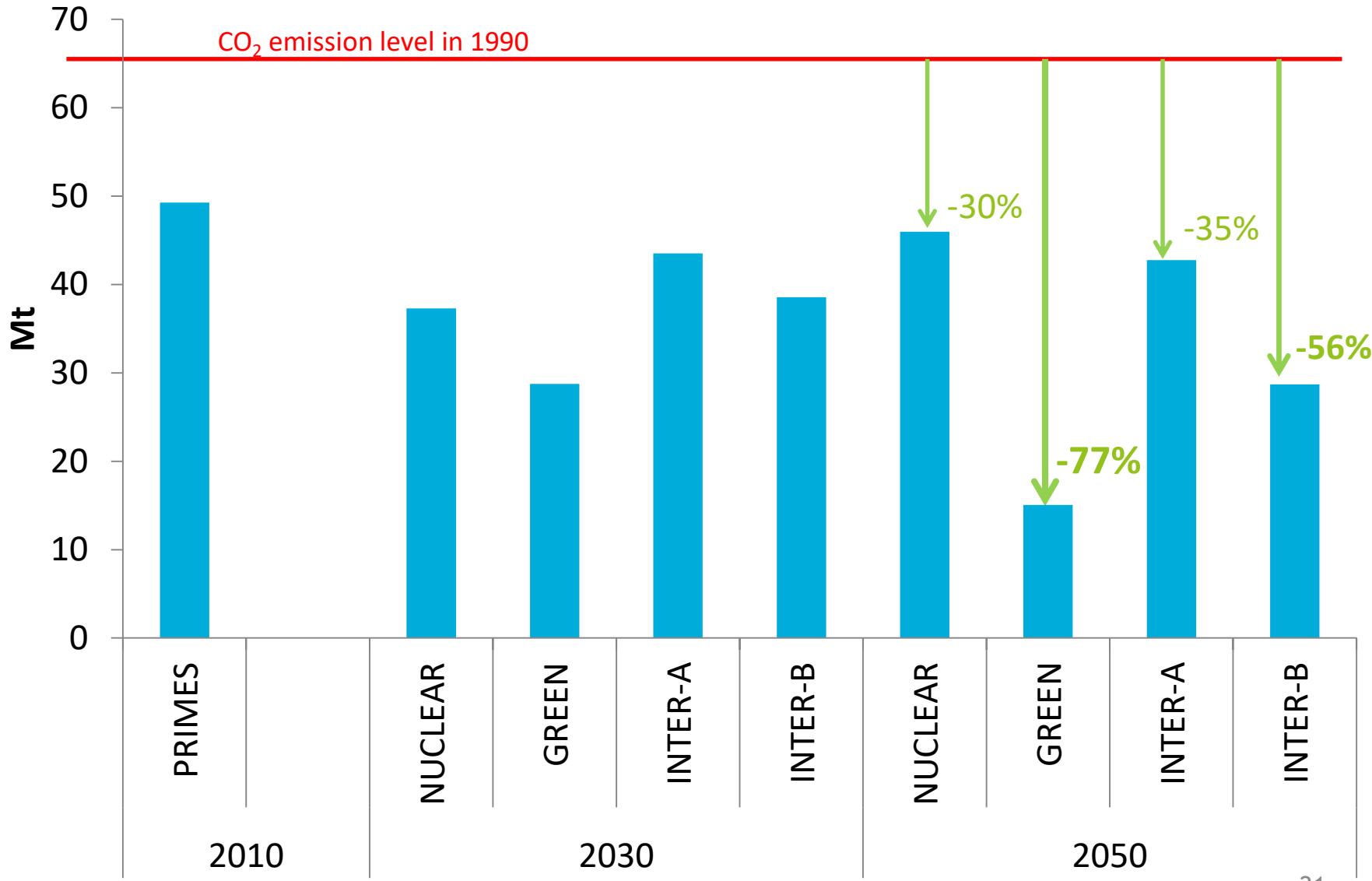


RENEWABLE SHARES



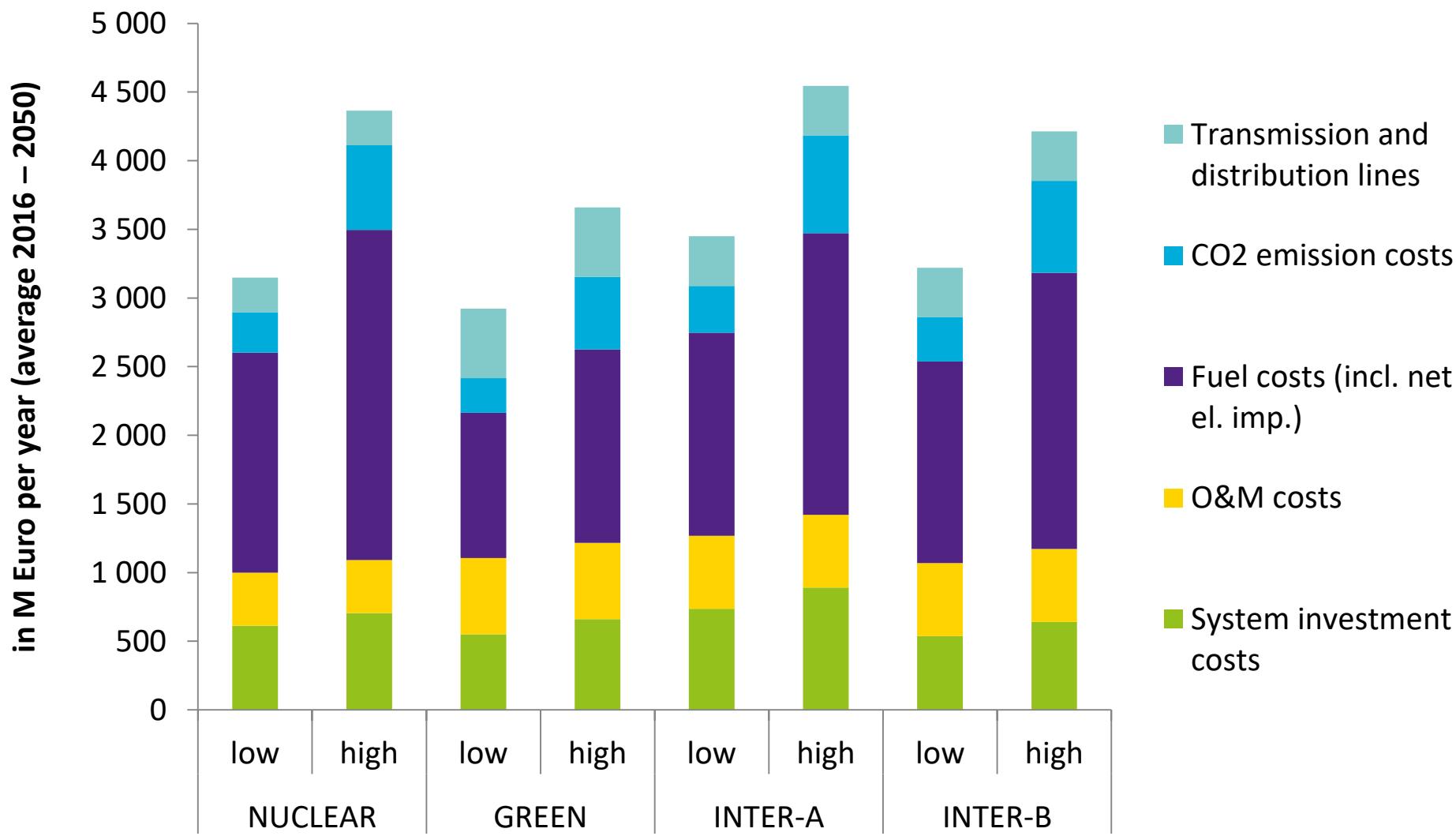


CO₂-SAVINGS





COSTS





CONCLUSIONS

- Hungarian energy system is working even without Paks II
- Technologically possible: it is a matter of political decision
- Further research: network development, social benefits, cost-efficiency



THANK YOU FOR YOUR ATTENTION!

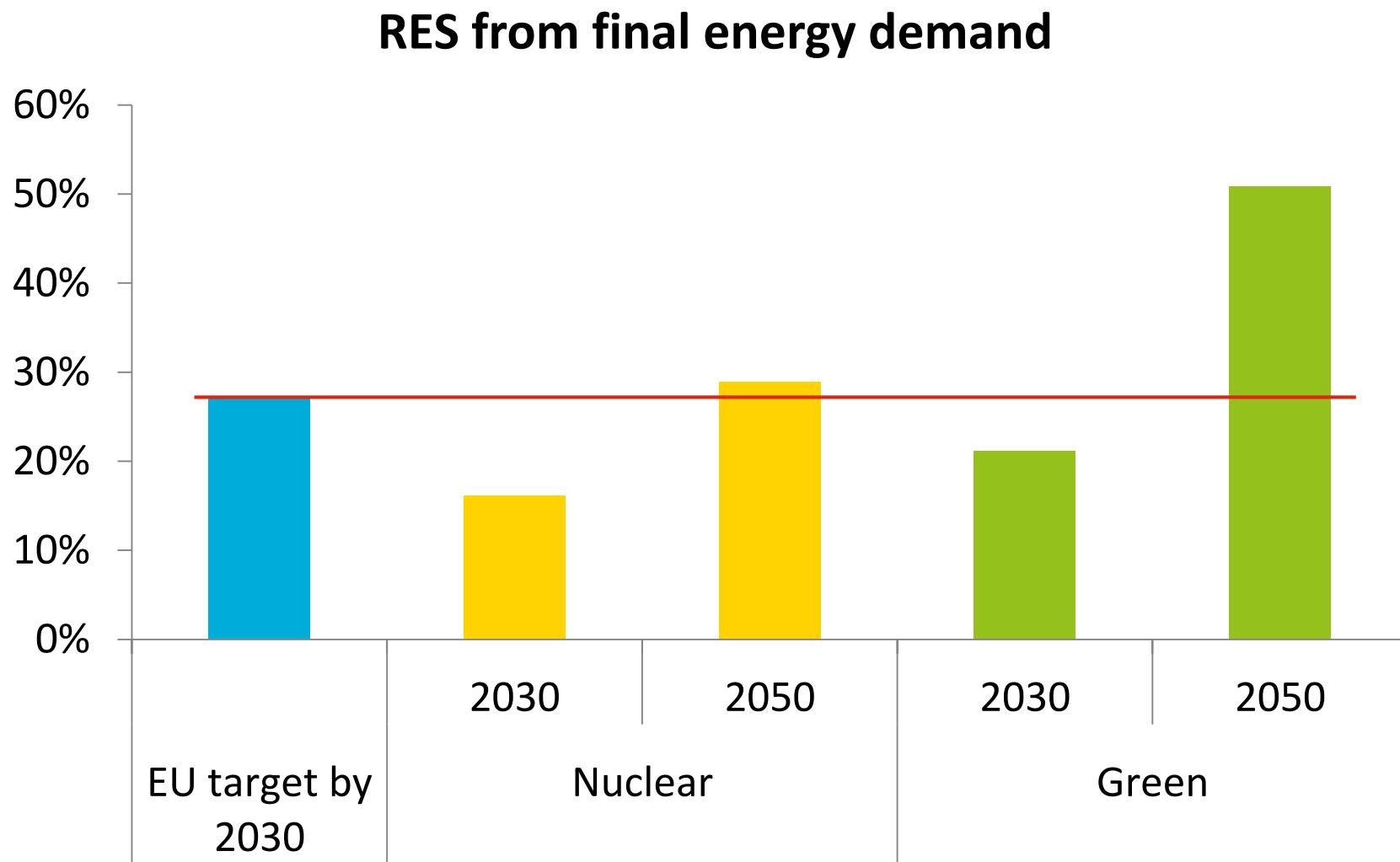
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ENERGIAKLUB

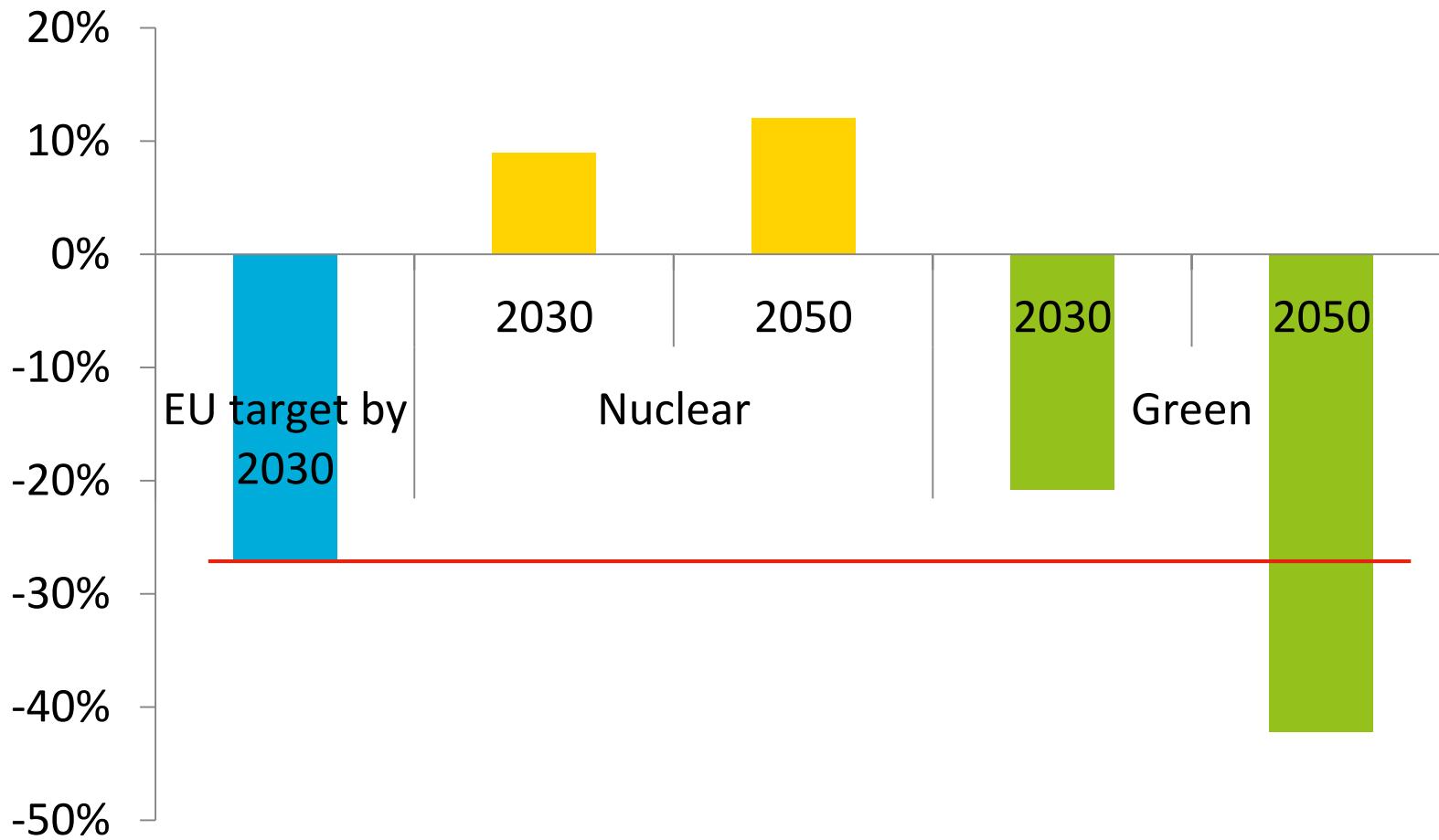
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EU GOALS

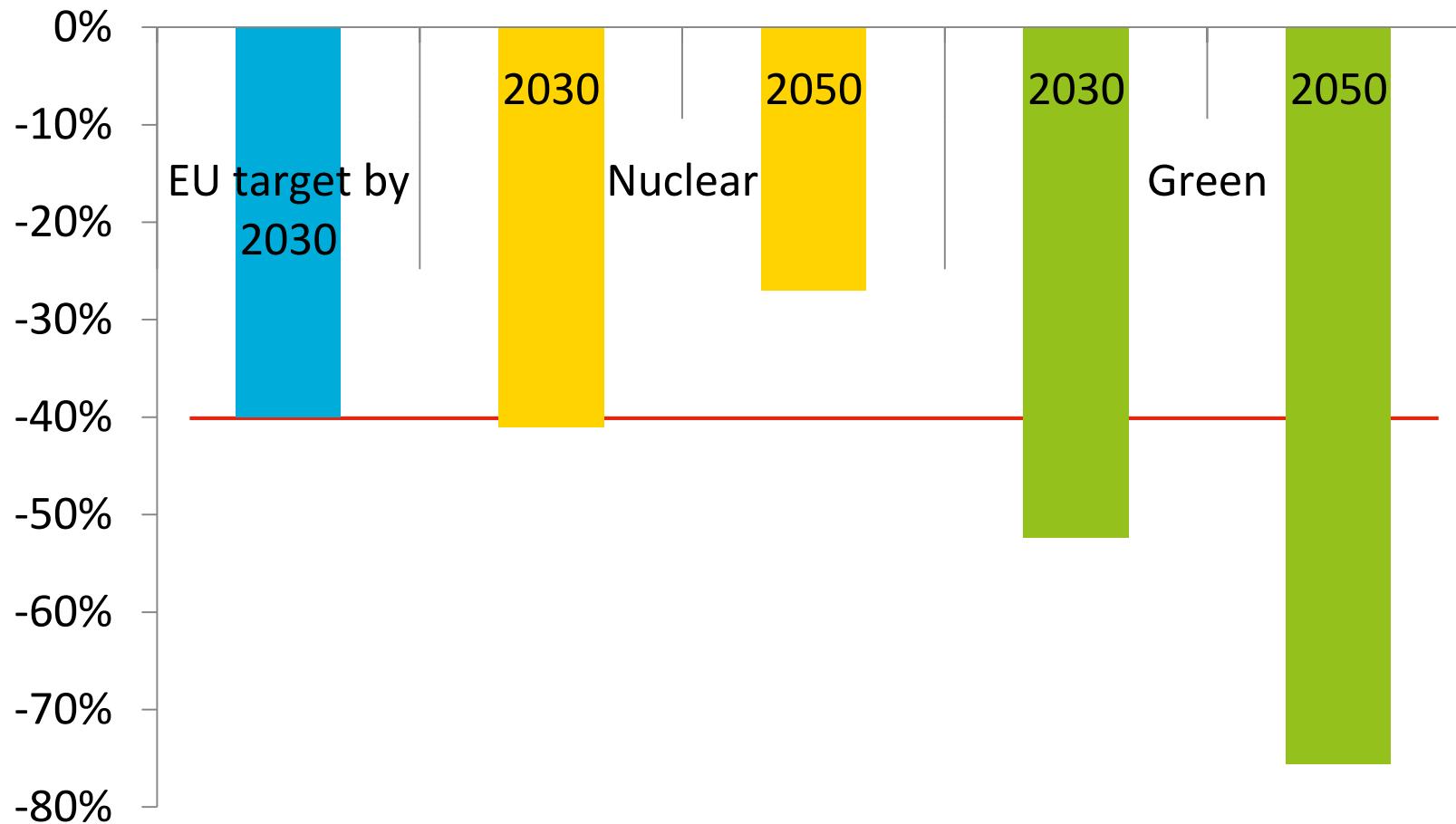


Energy savings compared to BAU /2010/





CO₂ emission savings compared to 1990 level





RENEWABLE POTENTIALS

