Fit for 55 Impacts on Czechia. Techno- and Macro-Economic Challenges and Opportunities

Vojtěch Máca*

with Milan Ščasný*, Lukáš Rečka*, Bence Kiss-Dobronyi°, Dóra Fazekas°, Ioannis Gutzianas°

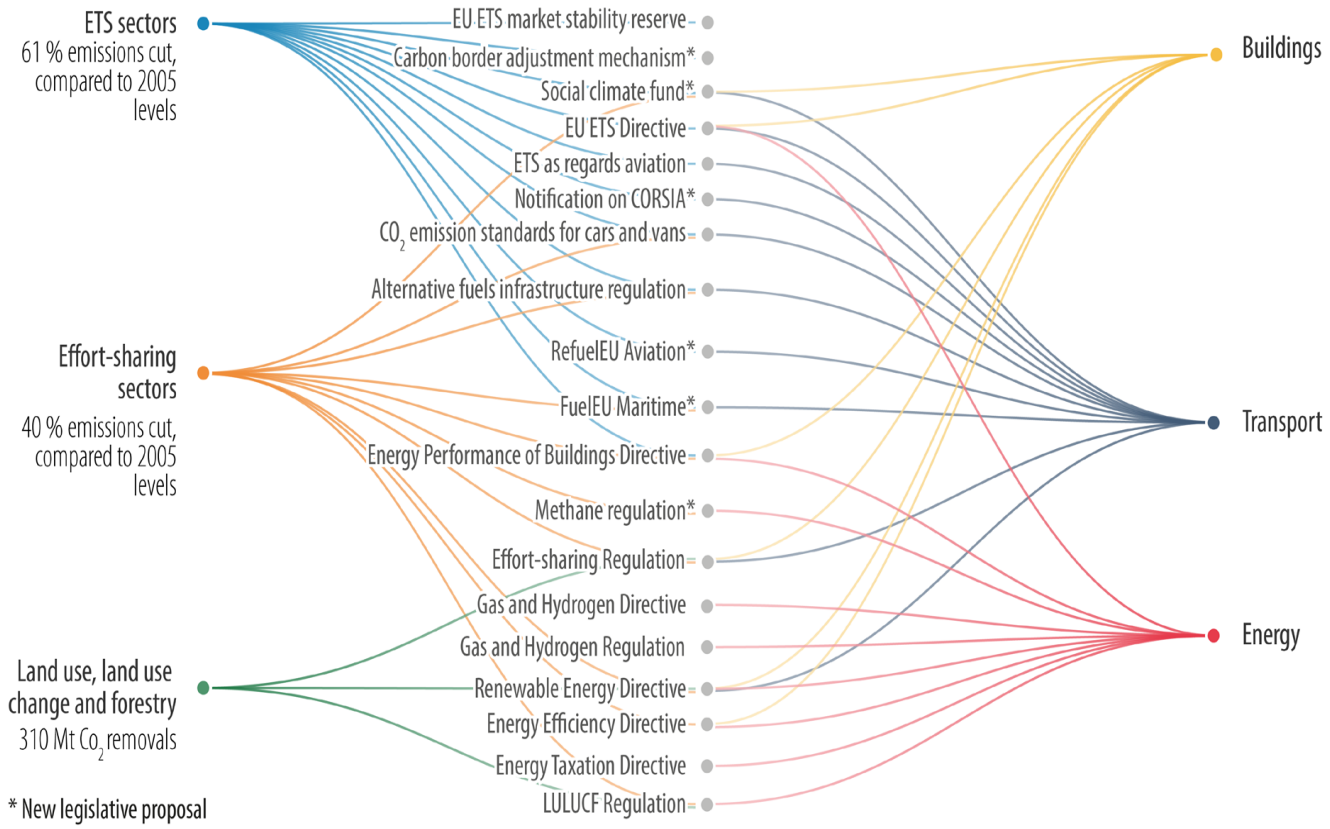
* *Charles University Environment Centre*
° *Cambridge Econometrics*

DECARB 2022, Prague, 11. 11. 2022

Center for Socio-Economic Research on Environmental Policy Impact Assessment

Introduction – Czech FF55 impact assessment

- commissioned by Ministry of Environment
- assess **the impacts** of the EU's Fit for 55 package, using macroeconomic and techno-economic models
- **primary objective -** reduce EU‘s **GHG emissions by 55% by 2030** (vs. 1990), and as much as possible fulfil other FF55 targets
- but also effectively exploit the growth potential of the transition to a low-carbon economy while avoiding major negative social impacts
- MoT simultaneously commissioned Deloitte to explore impacts of FF55 on firms and investment gap



Modelling suite

TIMES-CZ

- energy system cost optimization model
- covers the entire energy balance of the Czech Republic
- based on the IEA‘s model generator and used by several EU countries
- optimises the entire energy system → aims at the combination of technologies and fuels that meets the demand for energy services at the lowest total cost
- current horizon until 2050

E3ME

- a macro-econometric model based on post-Keynesian economic theory
- regularly used for policy impact analysis by the European Commission and its services
- allows the quantification of impacts on key macroeconomic variables (GDP, employment, consumption, foreign trade, energy use)

FF55 Impact Assessment was supported by an extensive model suite consisting of sectoral (PRIMES, PRIMES-TREMOVE, CAPRI, GLOBIOM) and macroecon-models (JRC-GEM-E3, E3ME, E-QUEST)

Scenarios

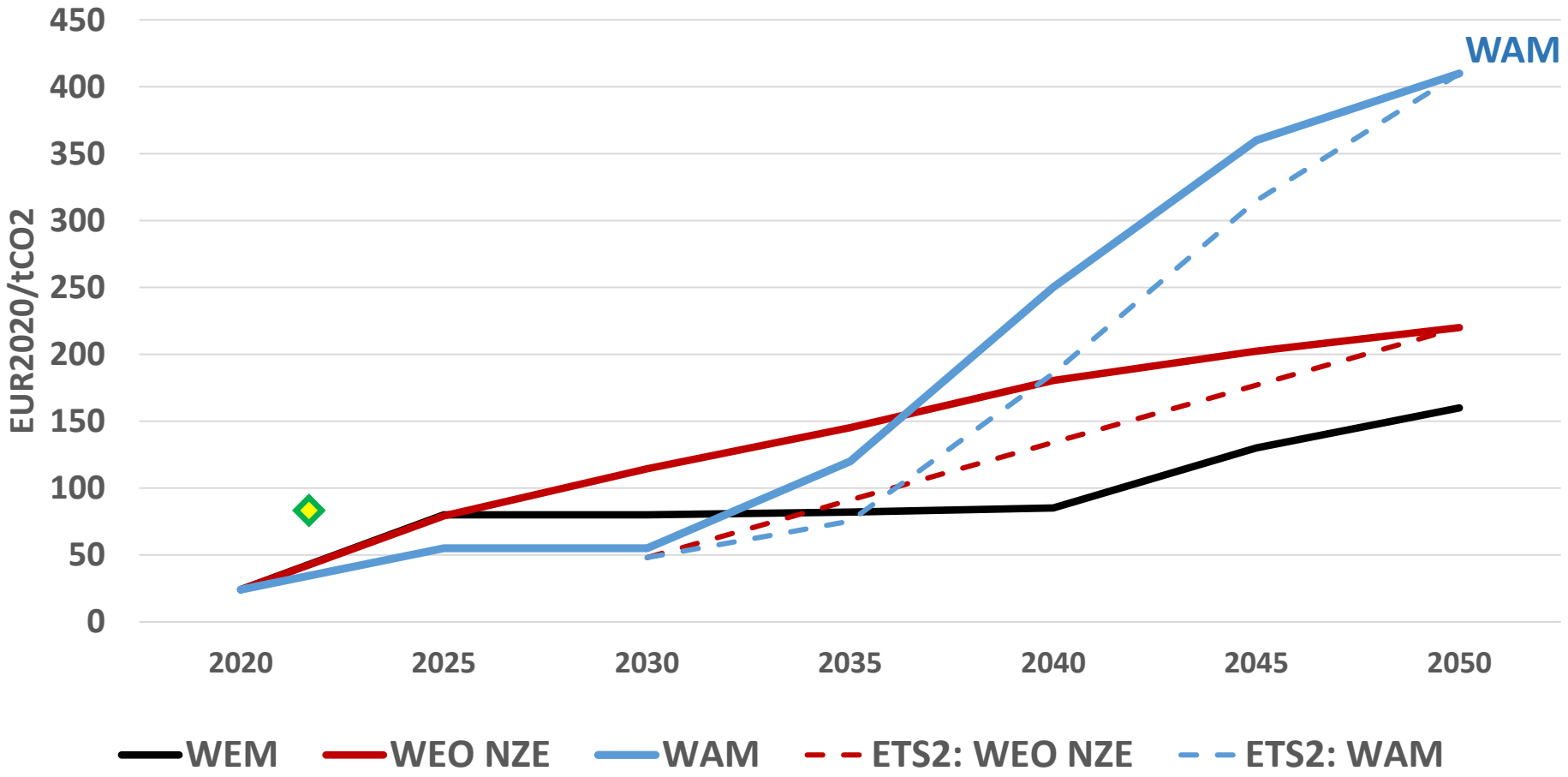
BAU (Business As Usual, „Ref.“ in TIMES)

- ✓ expected development of the economy
- ✓ already implemented measures (4th phase EU ETS)

Counter-factual scenarios, (**Fit-for-55**)

- **Revised ETS, ETS2** (2026+), **ESR**
  - *(exogenous)* ***price of EUA:*** *WEM, WEO-NZE, WAM*
  - *(exogenous) carbon emission* ***reduction target***
- **CBAM** *(NACE 20,23,24)*
- **Revenue-recycling (-> *macroeconomic modelling*)**
  - ✓ revenues: ETS+ETS2 = (ModF + InnovF + Social Climate Fund + State Budget}
  - ✓ use: state budget + compensations + climate(RES, EE, RFNBO, heating, BEV)
    - Low ambition (some revenues to SB)
    - High ambition (no revenues to SB)

EUA price trajectories (ETS1/ETS2)



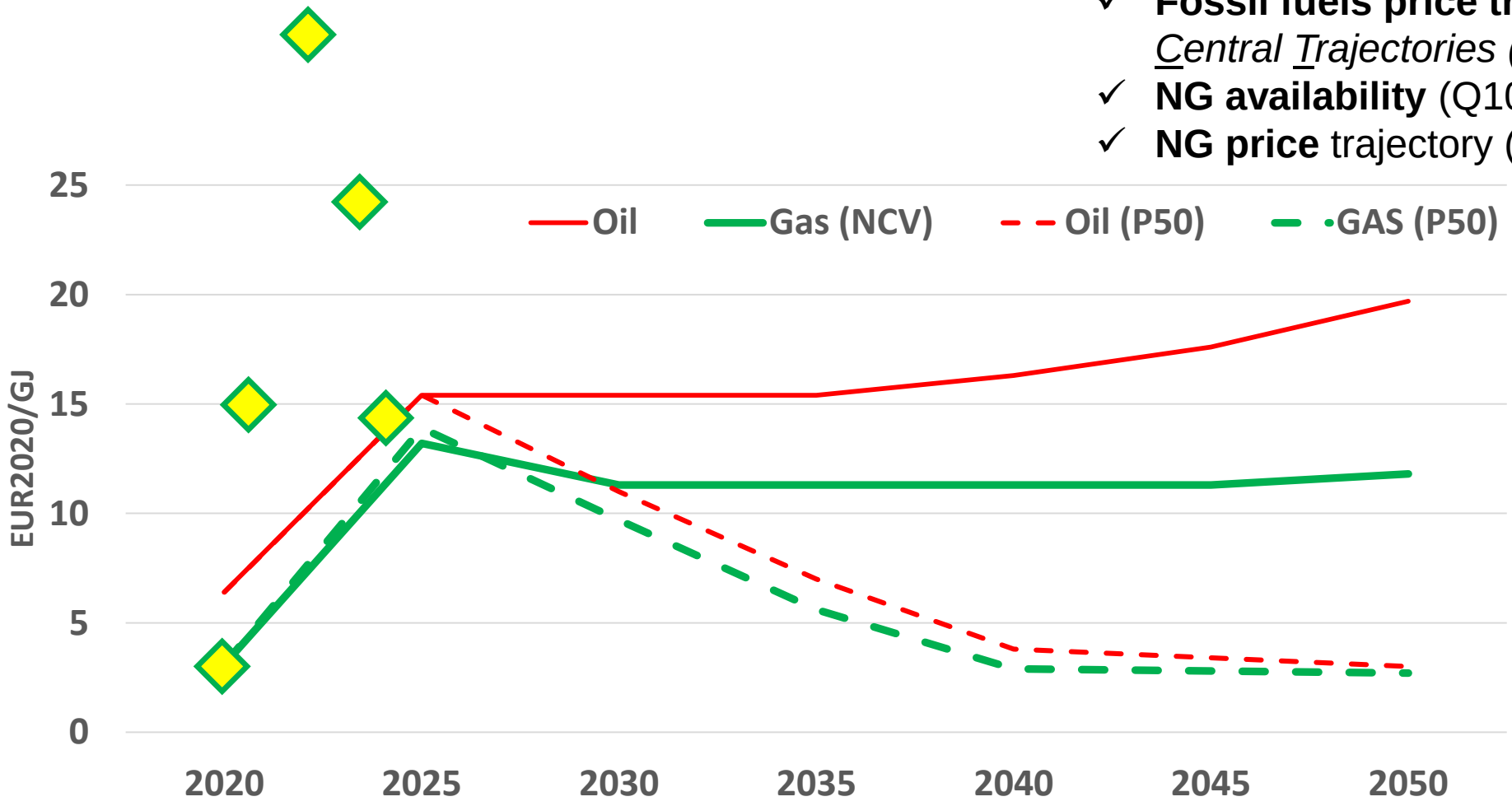
HCT – DG CLIMA‘s recommended parameters for GHG projections reporting in 2023

NZE – IEA‘s Net Zero Emission pathway

Fossil fuel price trajectories

reflection of Russia's war in Ukraine →
embargo on Russian imports

- ✓ **Fossil fuels price trajectory:** *Harmonized Central Trajectories (**HCT**:* EC 2022)
- ✓ **NG availability** (Q100, Q75, Q50 | *2019*)
- ✓ **NG price** trajectory (P50, P100)



HCT – DG CLIMA's rrecommended parameters for GHG projections reporting in 2023; P50 – IEA's Net Zero Emission pathway

◆ – Real / projected price of NG 2020-2024 (HCT, DG CLIMA 2022)

SEEPIA

Scenarios

REF + 11 policy scenarios distinguished by:

- ***policies adopted****: ETS1+**CBAM** / ETS1+CBAM+**ETS2*** ↓
- ***fossil fuel trajectories***
- ***EUA price trajectories***
- subsidies for RES and energy efficiency
- no new ICE cars and vans from 2035
- **RES potential**: MAF CZ 2021 Progressive scenario
- **availability of natural gas**: 100% / 75% / 50% of consumption in 2019
- **coal phase-out**: up to current mining limits / by 2033
- **nuclear**: Dukovany NPP (†2045) + new NPP (2045+ | 2040+ | cost. optim.)

RESULTS - GHG emissions

2 different decarbonisation trajectories projected:

TIMES-CZ

- RES development within the limits of the MAF 2021 Progressive Scenario
- faster decline in GHG emissions (coal phase-out + electricity imports)
- leads to a preference for carbon capture and storage and higher investment in energy savings

E3ME

- increase the share of RES significantly above MAF 2021 after 2030 (mainly PV and CHP)
- higher domestic electricity production maintained (→ net export balance)
- slower decline in GHG emissions → higher revenues from EUA auctions → higher state support for investments

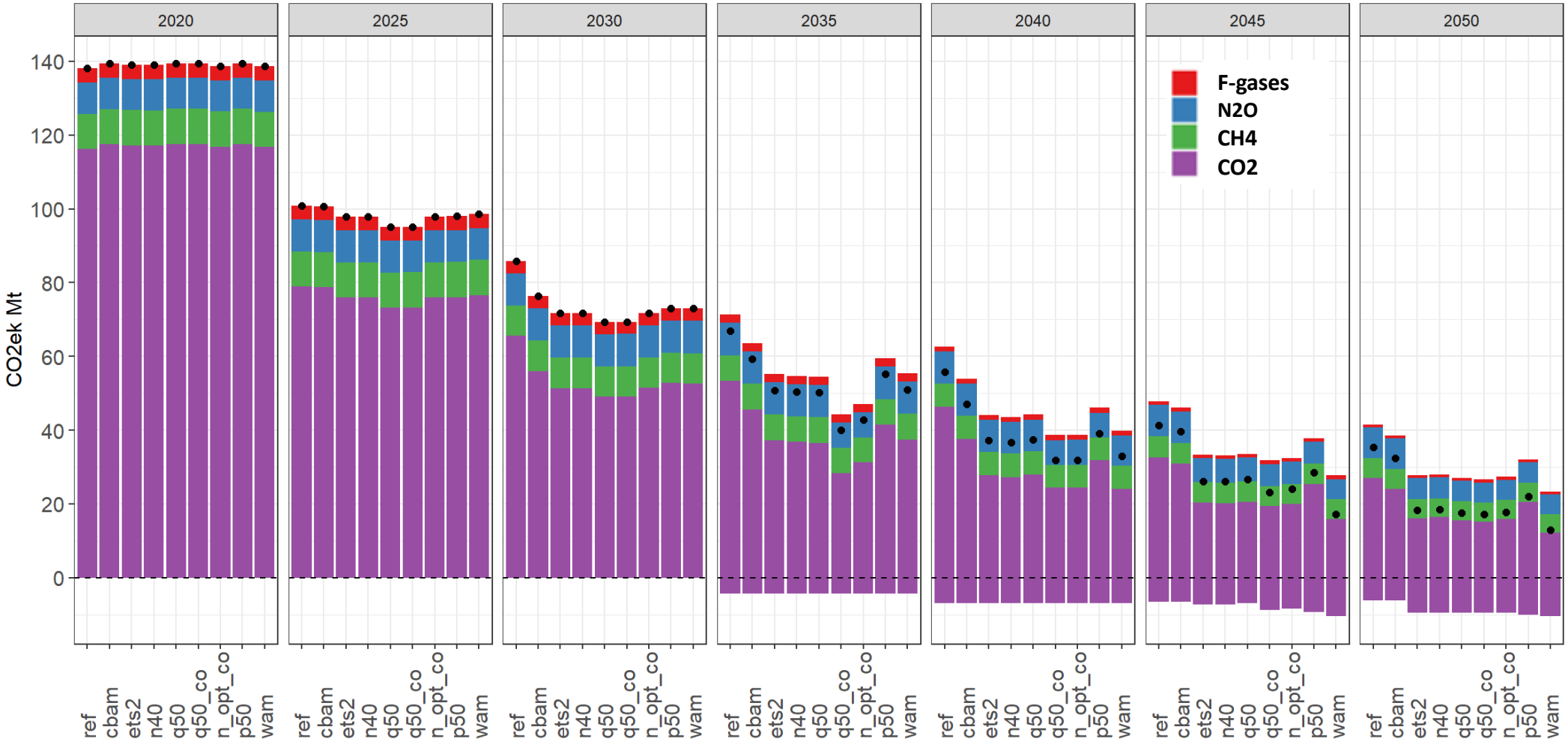
2030 targets

55% reduction target by 2030 (compared to 1990) **is achievable**

- also achieved in the REF scenario (-60%)
- ETS1 tightening with the introduction of CBAM reduces emissions by a further 5 pp (-65%)
- introduction of ETS2 leads to additional reductions of 1.6-3.4 p.p. (i.e. up to -68.4%)
- E3ME (*at EU27 level*) → -55% reduction in the EU27 implies ~47% reduction in Czechia

FF55 in not enough to bring us to „net-zero“ by 2050 → ~90% reduction possible, additional measures needed (agriculture, etc.)

GHG emissions by sector (incl. LULUCF & CCS)



Scenarios:

REF – reference

CBAM - no ETS2

ETS2

Q50 – NG availability 50%

N40 – new NPP earlier

P50 – NG 50% cheaper

WAM – higher EUA prices

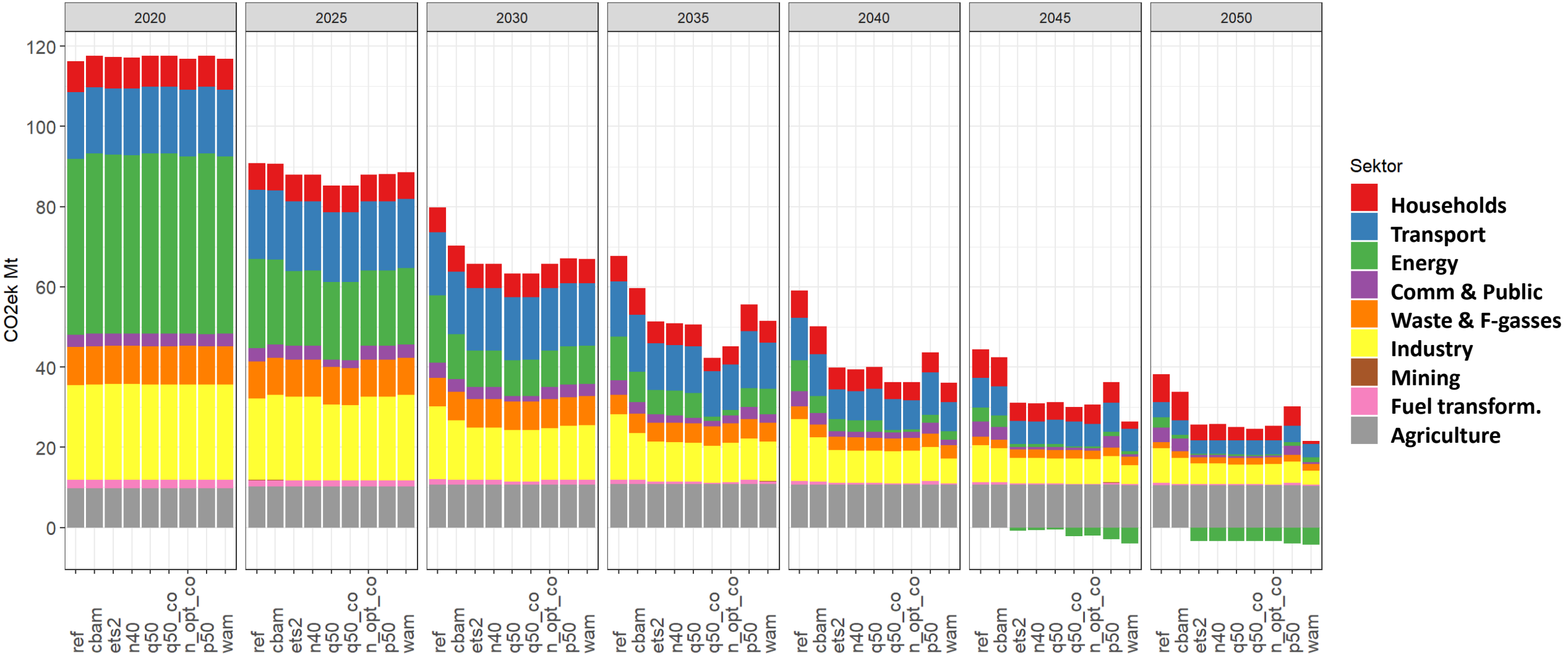
NO_CO – coal phase-out and cost optim NPP

Q50_CO – coal phase-out + restricted NG

*Note: due to bark beetle calamity, **forestry** will be a **significant carbon emitter** until at least 2032.*

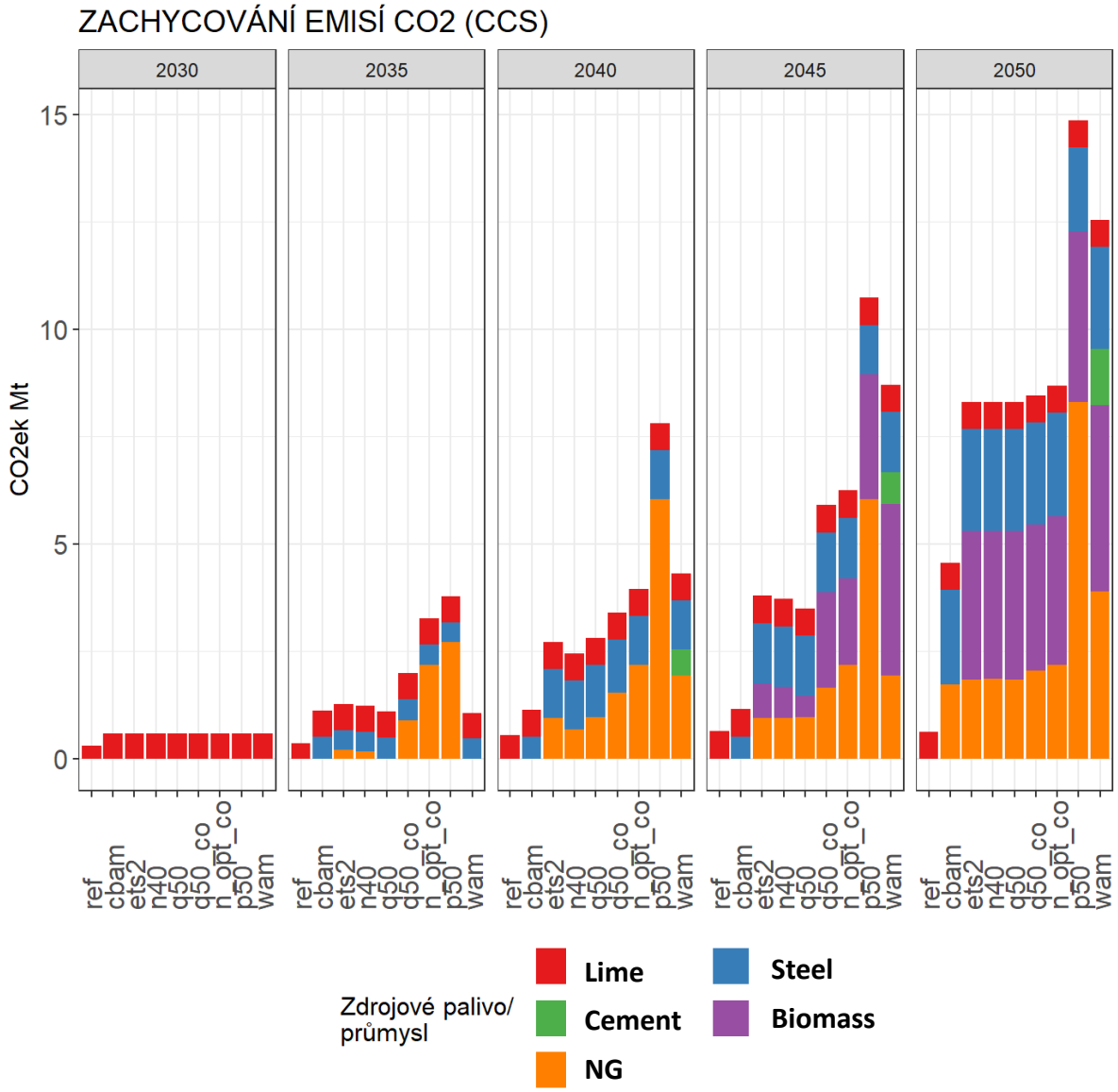
SEPIA

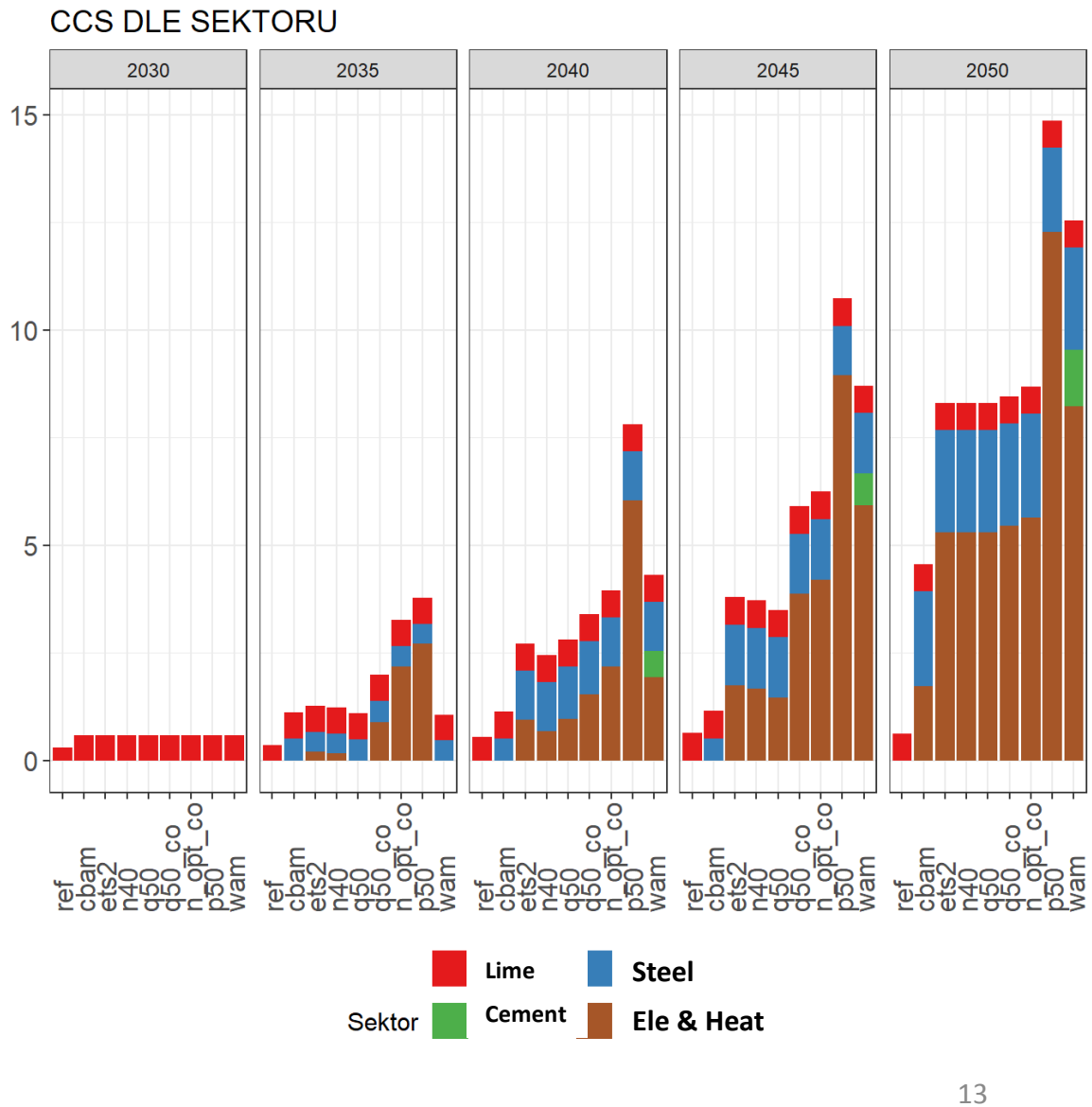
CO_2 emission by sector (excl. LULUCF)



SEPIA

GHG emissions: Carbon Capture and Storage





RESULTS - energy

2030 RES & EE targets

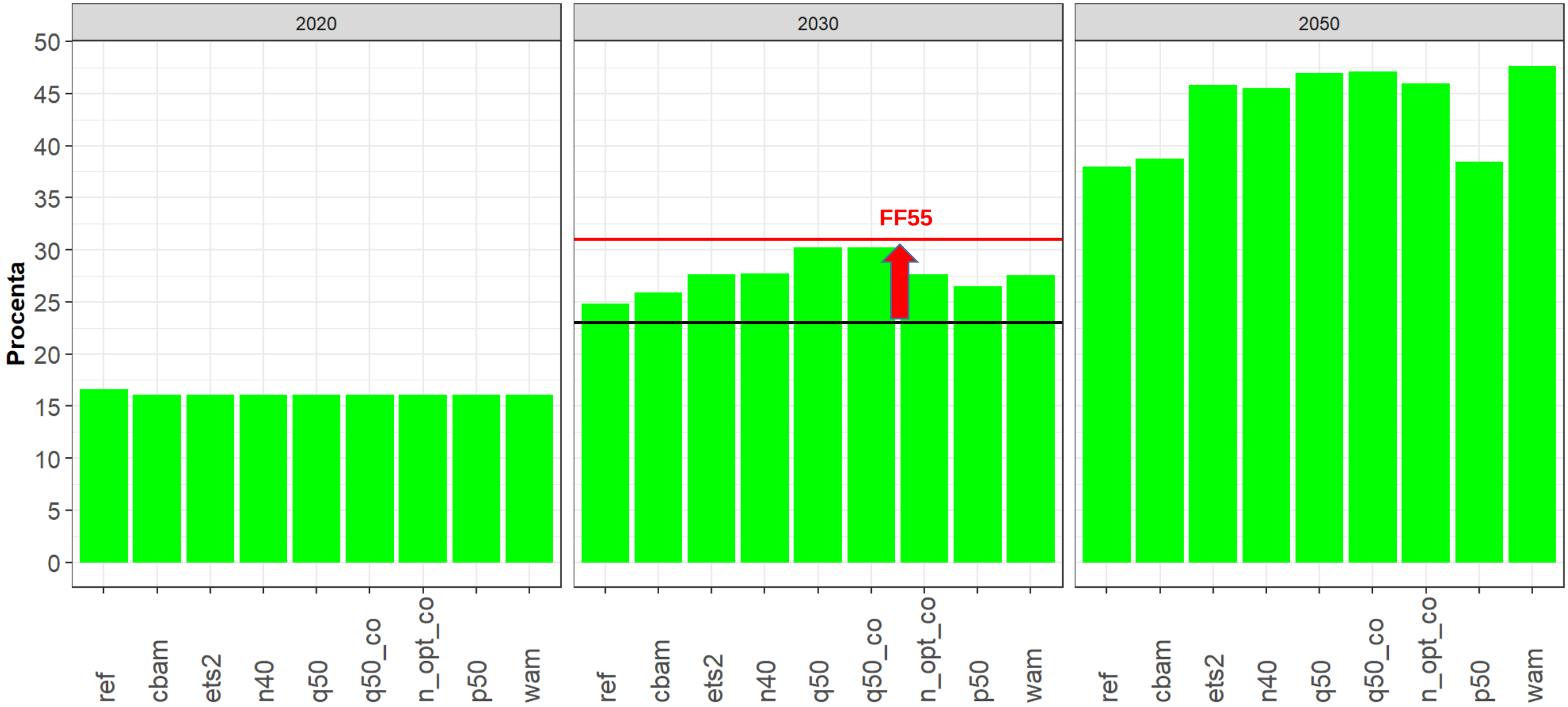
RES

- **31% share in 2030 likely difficult to achieve** (*given assumptions*)
  - scenario with limited NG availability comes closest
  - importance of increasing energy efficiency / savings

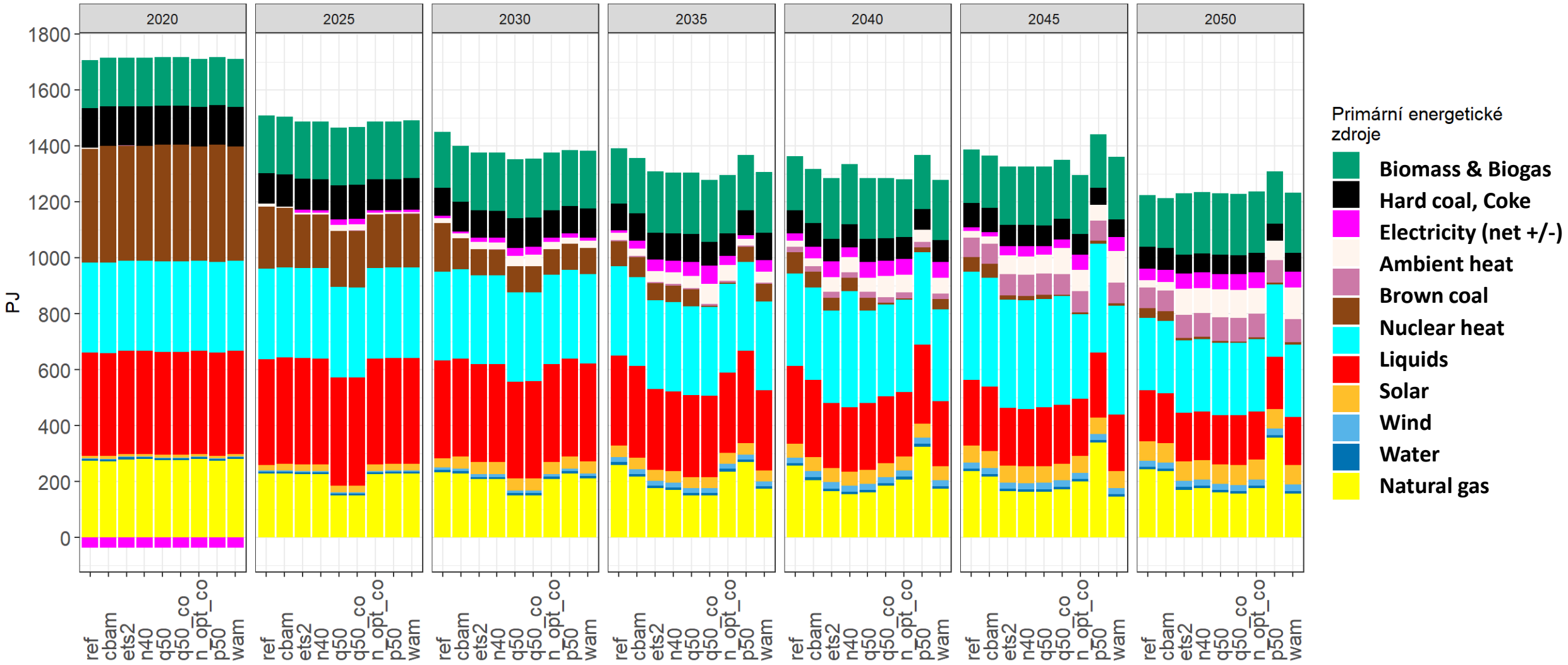
Energy Efficiency

- Consumtpion of primary energy sources reduced by 14-20 %
- Final use reduced by 2-7 % in 2030 (compared to 2020), much less than the EU targets
  - *PES (2030): 1350-1450 PJ*
  - *FU (2030): 974-1015 PJ*

RES share (on gross final use)

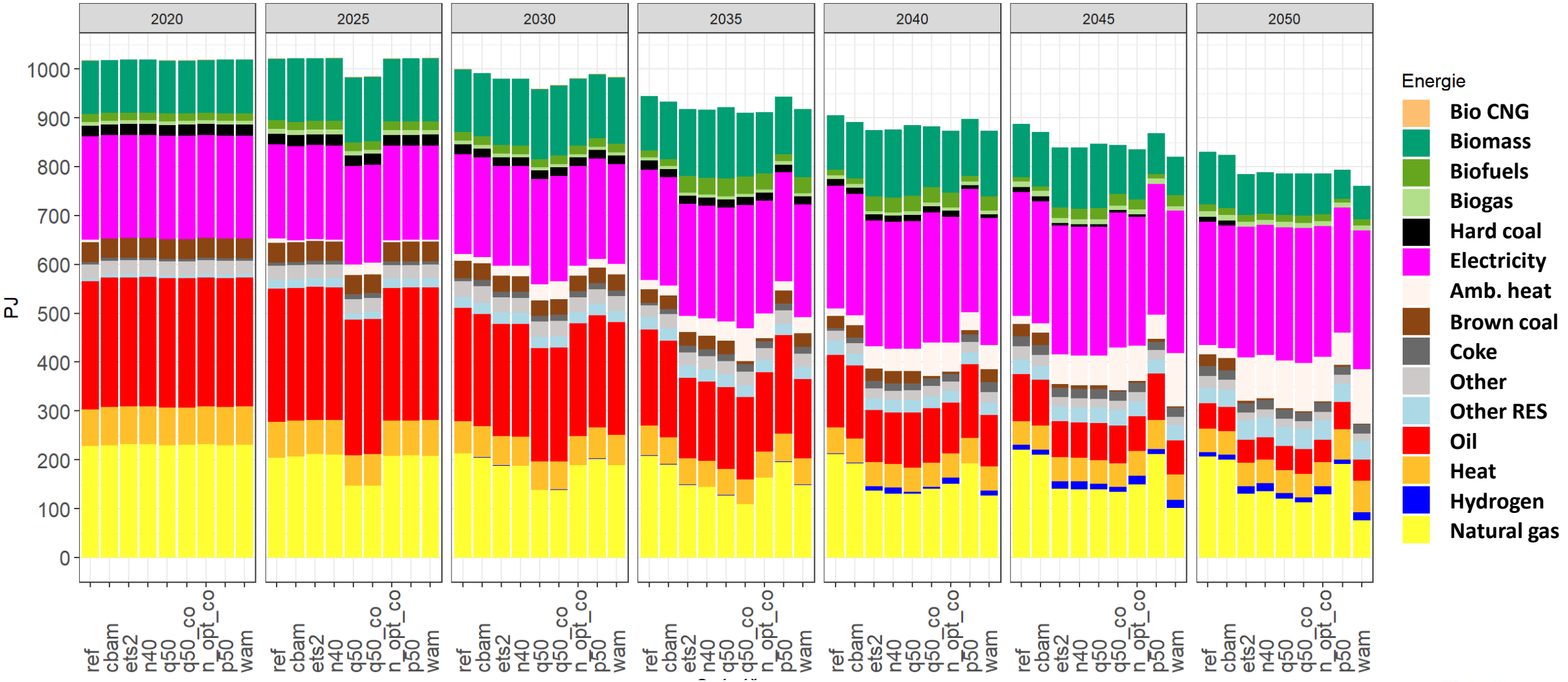


Consumption of primary energy sources (PJ)



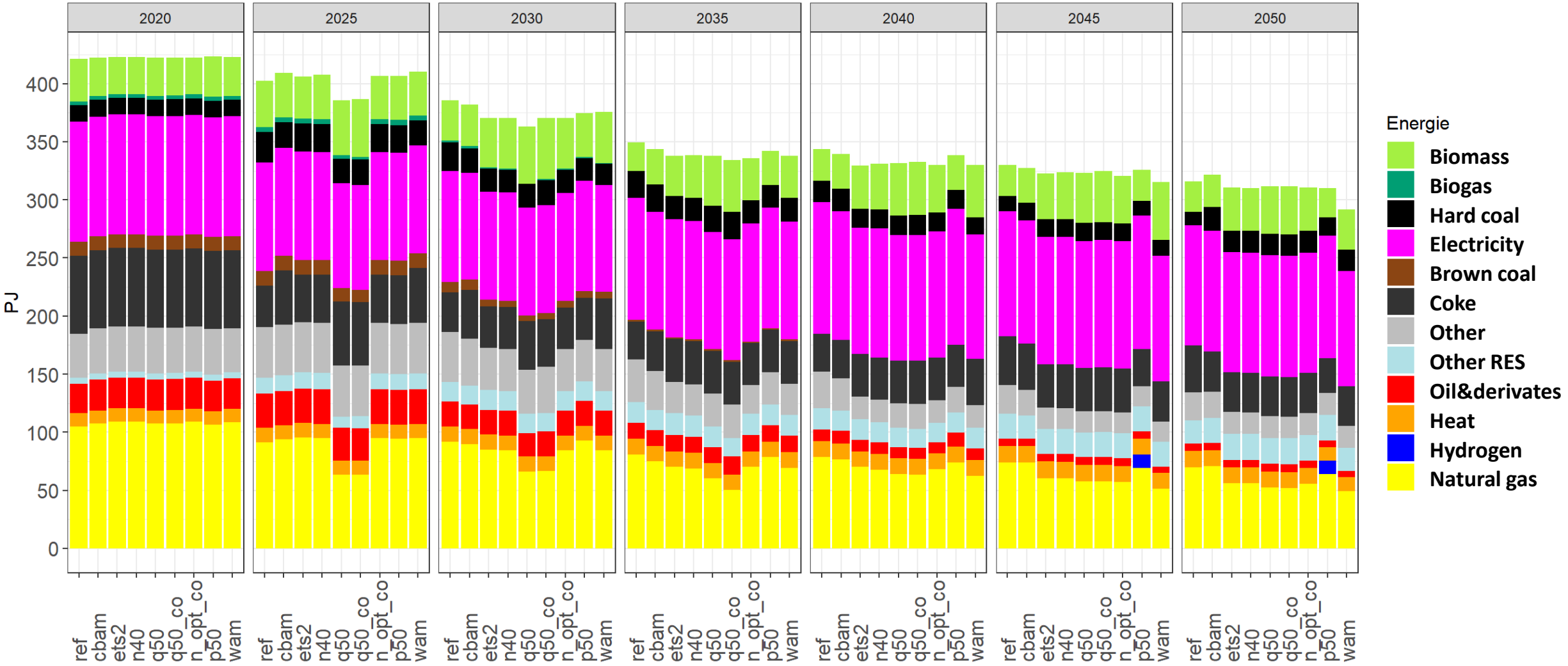
SEPIA

Final energy use (PJ)

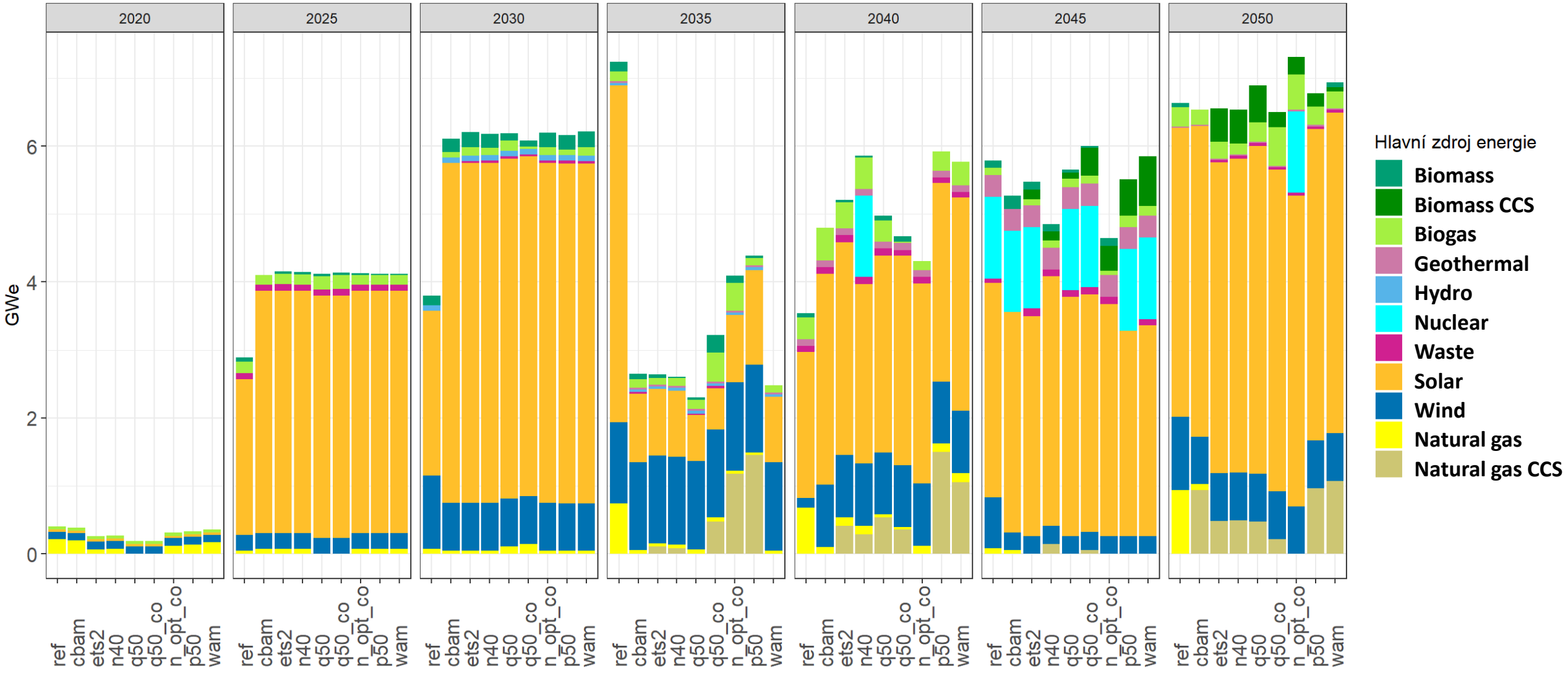


SEPIA

Energy consumption in industry (PJ)



New installed capacity, electricity generation, GWe



SEPIA

Costs & Investment needs

Investment & Costs of Fit-for-55 (TIMES-CZ)

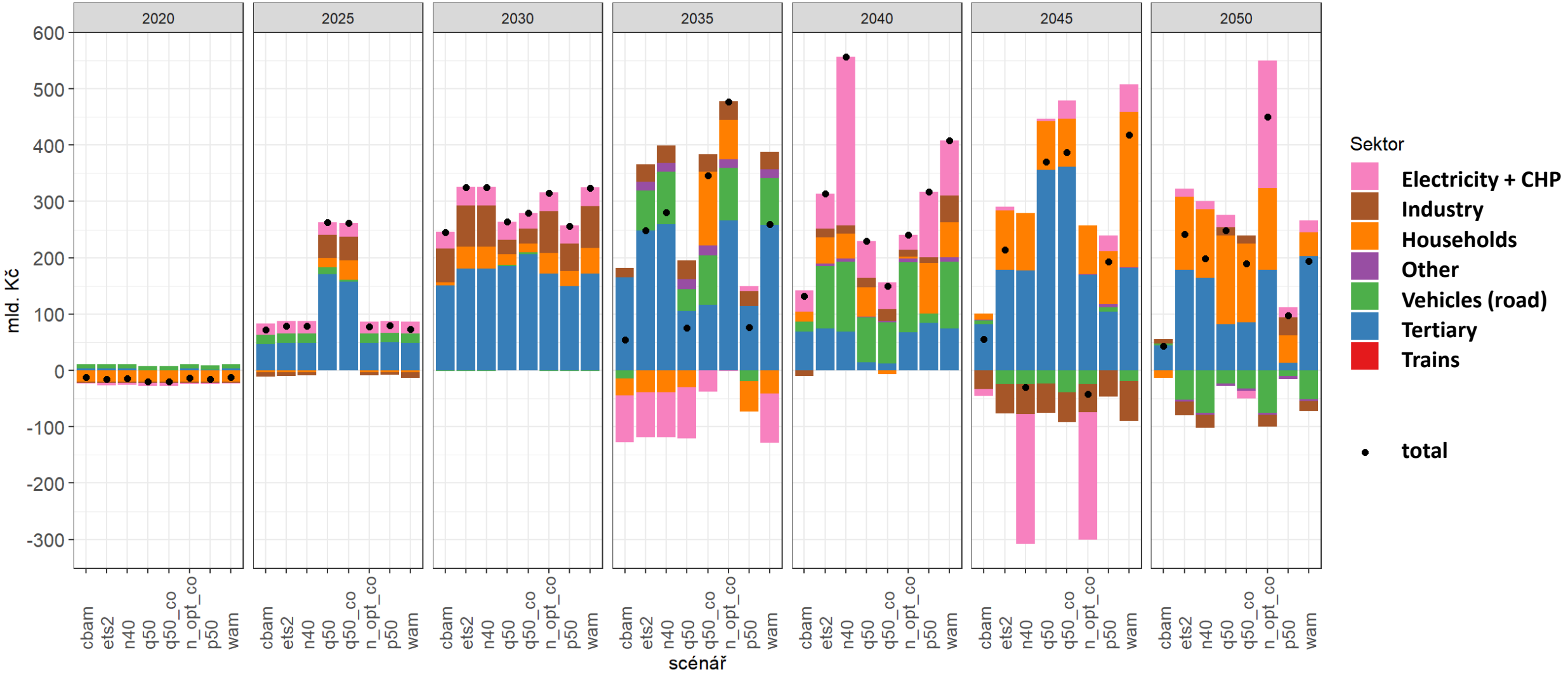
Investment	2020-2030:	**~5,500 bln. Kč**	***in BAU: ~5,000 bln. Kč***
	2031-2050:	**~ 13,500 bln. Kč**	
Total Costs	=	Investment + O&M + Fuels + taxes – bonus + EUA	
Total annualised costs:	2020-2030:	**~1 100 – 1 350 bln. Kč**	
	2031-2050:	**~1 300 – 1 800 bln. Kč**	

Incremental costs should consider investments in BAU, investment support, and financial savings due to energy efficiency!

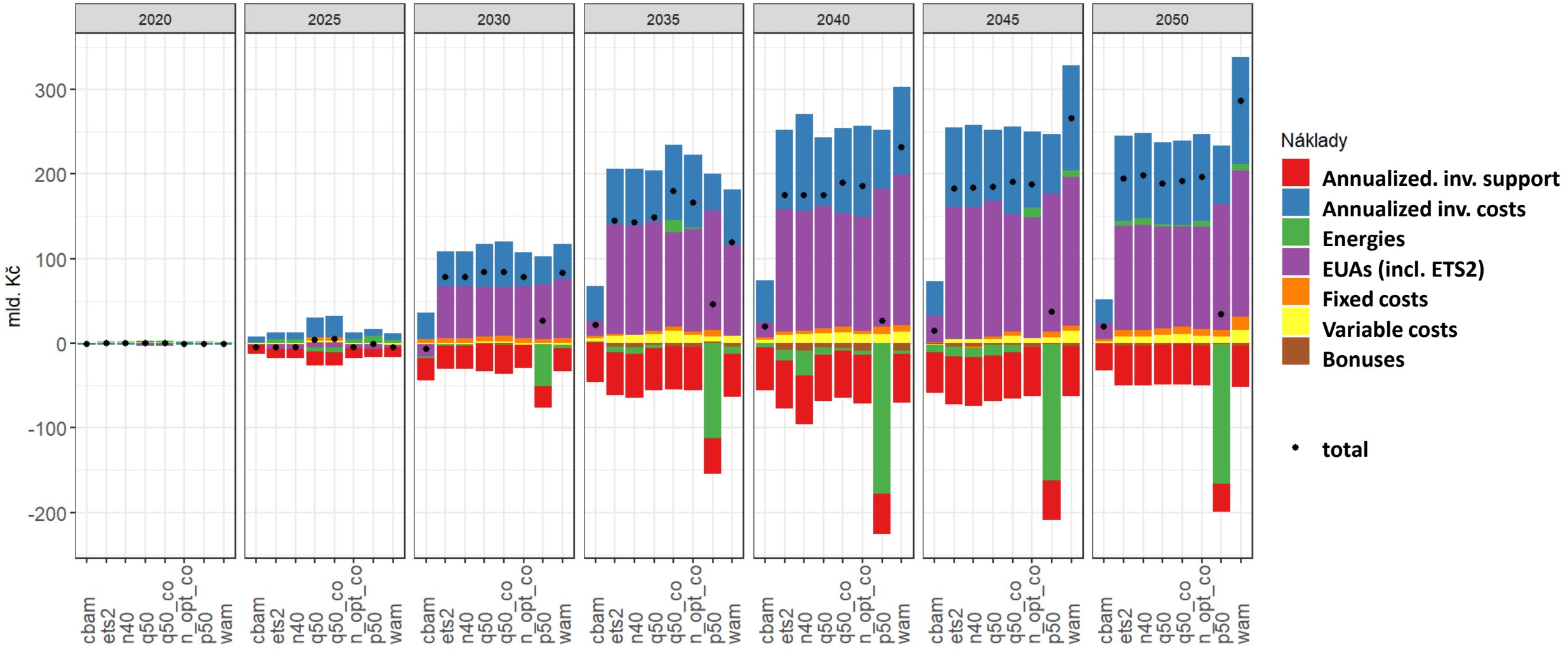
Incremental costs are small:

(2023-2027):	(±10 bln. Kč)
(2028-2032):	<100 bln. Kč
(2033-2050):	<180 bln. Kč
(WAM):	<280 bln. Kč
(P50):	<50 bln. Kč

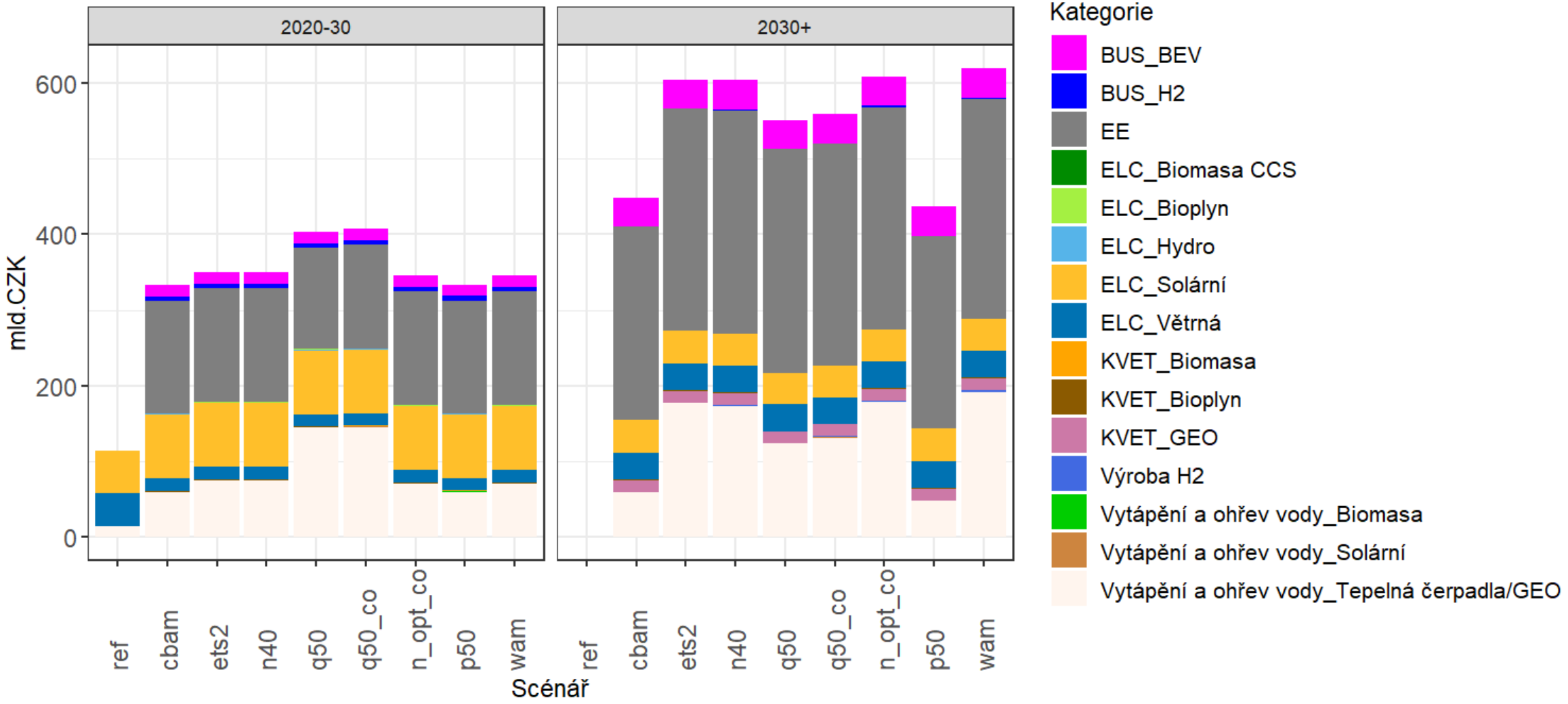
Investment costs: difference vs. REF (5yr sums, 2020 prices)



Annualized costs: difference vs. REF (2020 prices)



Investment support (cumulative 2020-2030|2030+)



SEPIA

Subsidies

by 2030 (or 2032):

- **TIMES**: **< CZK 400 billion**, mostly in scenarios with limited availability of NG
- **E3ME**: **450-900 billion CZK**, 370-720 billion CZK in ETS1 and 100-225 billion CZK in ETS2
- This volume corresponds to the resources foreseen in the ModF, InnovF, SCF, but
  - ➢ sufficient number of quality projects needed
  - ➢ projects from all EU Member States compete for InnovF funding

from 2032 to 2050:

- **TIMES**: <600 billion CZK; limited gas availability leads to accelerated investments already before 2030

Macroeconomic impacts

GDP

- Slightly **positive** due to investment in innovative (efficient) technologies
- Important how **revenues are recycled** back to the economy (investment support superior to lowering PIT, VAT & SSC)
- Can be green (any) regulation **economy-boosting**? → innovation may induce loans (utilising – to date – insufficiently used capacities) → **no "crowding-out"** investment

Social impacts

- Negative, but small and depend on behavioural response (+can be mitigated by targeted revenue recycling)

Employment

- Overall increase, but only if there any free capacities (no in full employment, with "no" unemployment)
- labour demand may increase in construction sector by +4%, +8%, and +12% in 2025, 2030, and 2035 (but labour shortage in RES & EE sectors already today..)

Conclusions

- FF55 targets ambitious, but generally feasible (EE the hardest)
- study shows urgent need to set effective state investment policy and support
- use revenues from GHG pricing wisely
  - climate investments (ETS2 sectors), mitigation of social impacts → climate transition can lead to increased economic activity & overall positive effect on GDP, employment etc.
- to be continued → analyses of REPowerEU etc.

Thank you for your attention!

vojtech.maca@czp.cuni.cz

Study available (in Czech) at www.seepia.cz

T A
Č R

Acknowledgement: Support provided from the Technology Agency of the Czech Republic within the Environment for Life Programme SS04030013: Center for Socio-Economic Research on Environmental Policy Impact Assessment and SS02030031: Integrated air quality research, assessment and control system

SEPIA