



REFLEX - ANALYSIS OF THE EUROPEAN ENERGY SYSTEM UNDER THE ASPECTS OF FLEXIBILITY AND TECHNOLOGICAL PROGRESS

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REFLEX Project Scope and Applied Approaches





Partners of the REFLEX-Project





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Possible scenarios for shaping the European energy system

CENTRALIZED	Fossil and nuclear based energy system	Existing System		Mod-RESFlex Scenario (central)GHG emission reduction:• project result (explorative approach)RES-share in power generation:• ~55% in 2050°)	High-RESFlex Scenario (central)GHG emission reduction: • ~ -80% in 205020RES-share in power generation: • 80-90% in 2050 • trend to centralized wind power	European energy system is based on 100% renewable energy sources
Conventional				Focus in REFLEX	High-RESFlex Scenario (decentral) GHG emission reduction: • ~ -80% in 2050 RES-share in power generation: • 80-90% in 2050 • trend to decentr- alized solar power	Renewable



1) EU Reference Scenario 2016 (Capros et al. 2016) 2) EC Roadmap for moving to a competitive low carbon economy in 2050 (COM 2011/0112)

What is the residual load curve and how do renewable sources affect the residual load curve?

Residual load = load – (intermittent) feed-in from renewable energy sources (RES) ... has to be satisfied by flexible (in general conventional) capacities





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System perspective Adaptation of "optimal" capacity?



Necessary generation portfolio – what will change?

- Reduction of base-load and mid-load
- Increase of peak-load
- Increase of storage power plants

What to do with the surplus?





Considered scenarios to determine the required flexibility

Framework conditions	Source	Less ambitious	More ambitious
Population	Population growth (CAGR) until 2050 EU Reference Scenario 2016	D Hi	Lo
Economic growth	GDP growth (CAGR) until 2050 EU Reference Scenario 2016	Hi	Lo
Fossil fuel prices	Wholesale prices in 2050 EU Reference Scenario 2016	Lo	Hi Mod- RESFlex
CO ₂ prices	EUA prices in 2050 EU Reference Scenario 2016 & REFL	Lo	
Policy targets			RESFlex
GHG emissions reduction	Overall emissions reduction in 2050 compared to 1990	Lo	Hi
RES share	Share or renewable energy in power generation in 2050	Lo	Hi
Energy efficiency	Share of technical potential exploite in 2050	d Lo	Hi



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Thank you! Questions?

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