

Flexible Operation of CHP

Chances for the Integration of Renewables?

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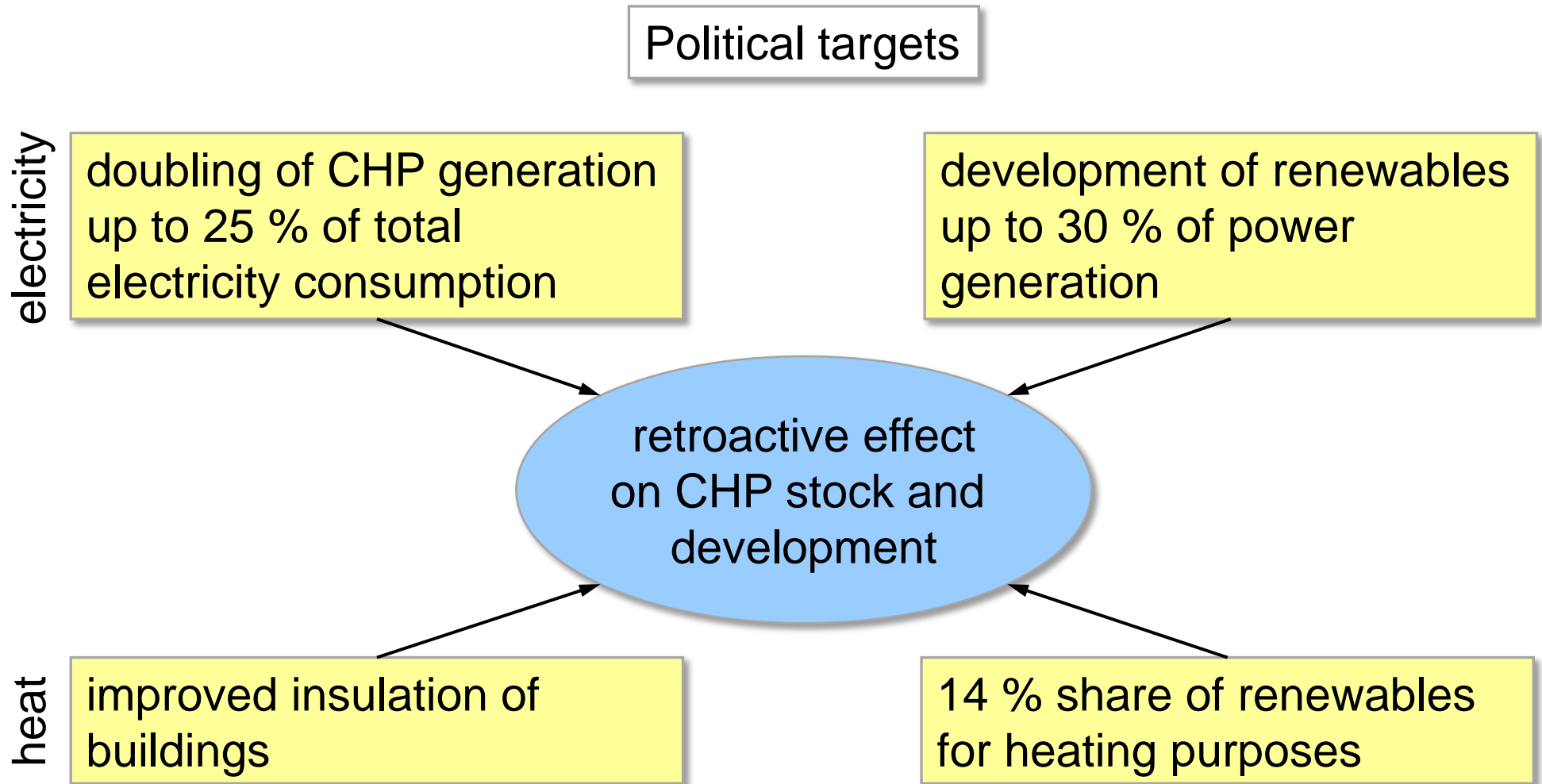


Overview

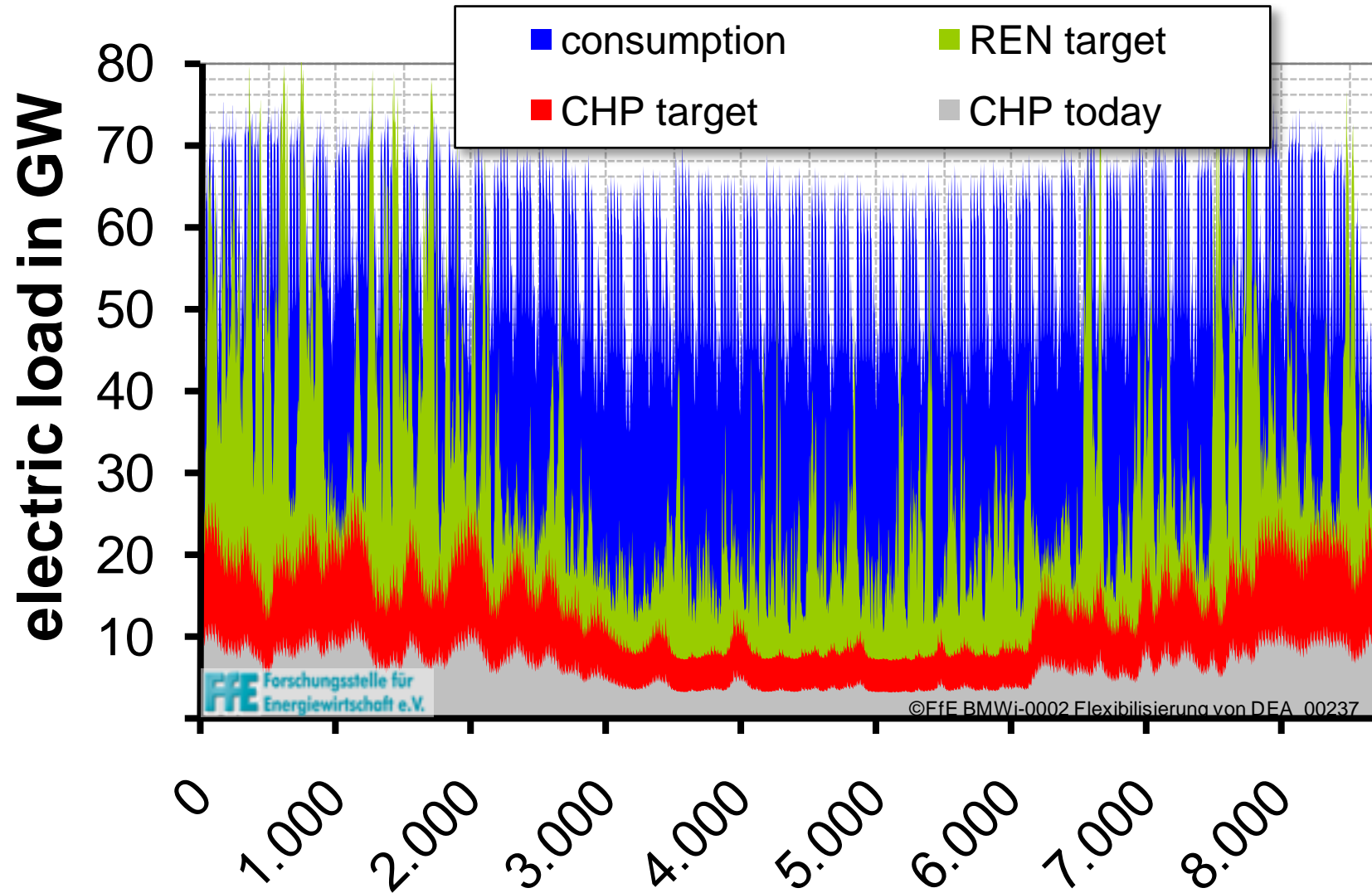
1. Motivation and Challenges
2. Analysis of Load Profiles
3. Options for a Flexible Operation of CHP
4. Summary and Conclusions

Motivation and Challenges

Germany's political framework: Integrated Energy and Climate Programme (IEKP)



Analysis of Load Profiles for Political Targets



Key Question:

Can the political targets for CHP and renewable energies be reached by making CHP's operation more flexible?

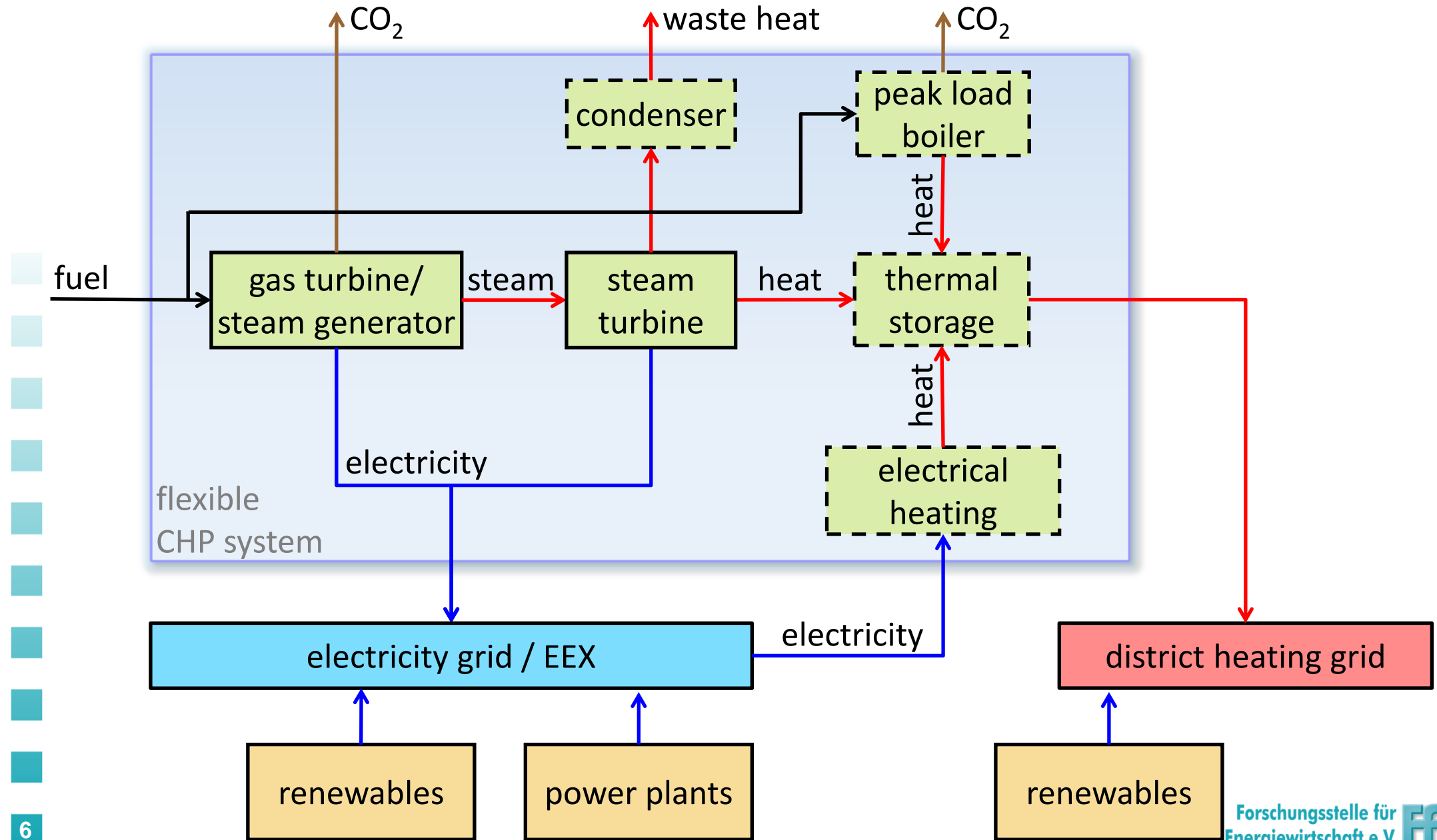
- **Modulation of the power and heat ratio**

Different possibilities to modulate the CHP coefficient can be applied; in particular varying the amount of the extracted steam mass flow in extraction condensing turbines shows great success.

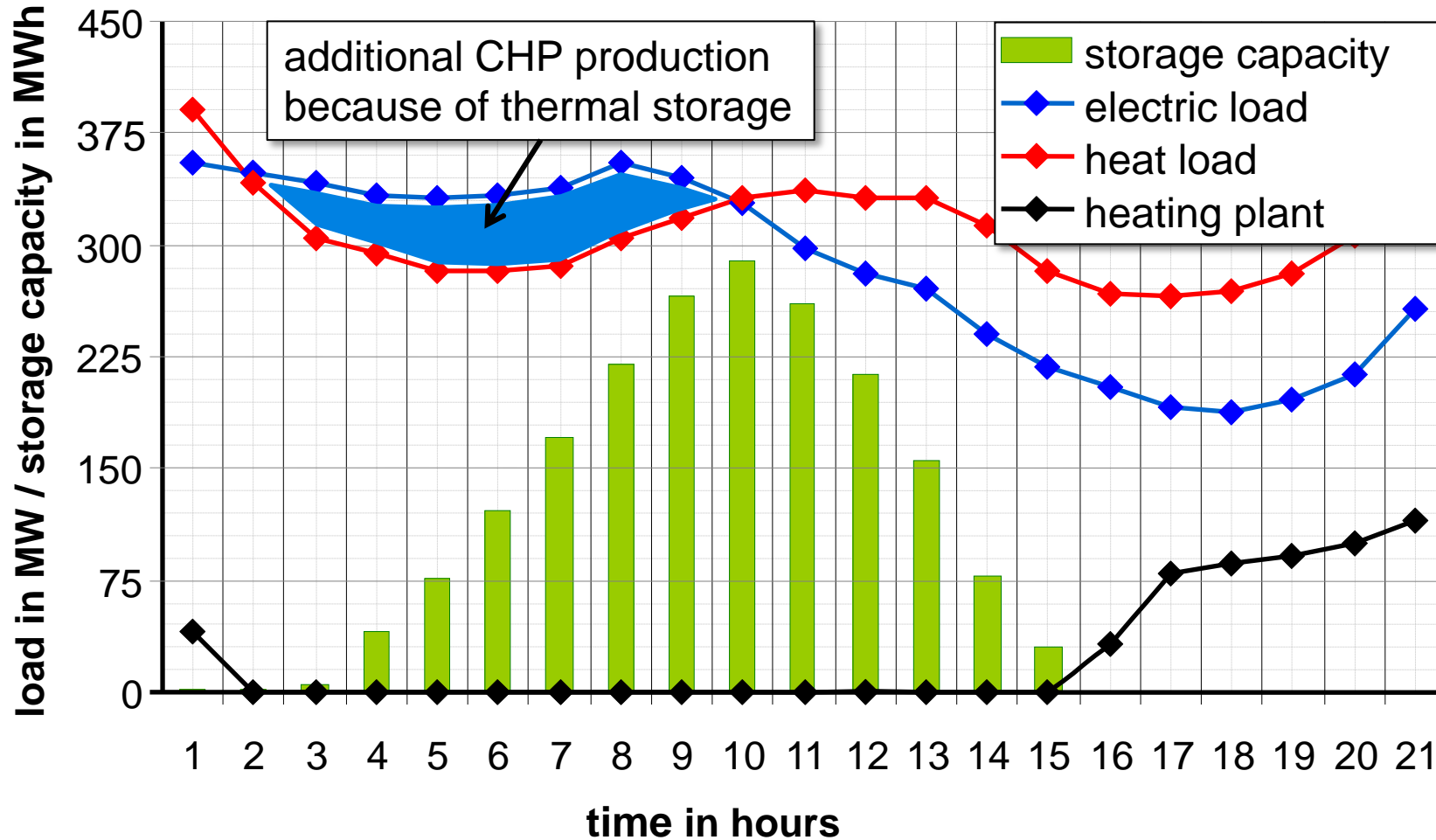
- **Thermal storage**

Heat can be stored without any great technical efforts. Thus one possibility to uncouple the CHP heat- and electricity generation is to use thermal storages. As a result, the plant utilisation period of the CHP electricity-generation can be increased.

Simulation Model for Analysis of a Flexible CHP System



Use of thermal storage to increase the electrical CHP-production

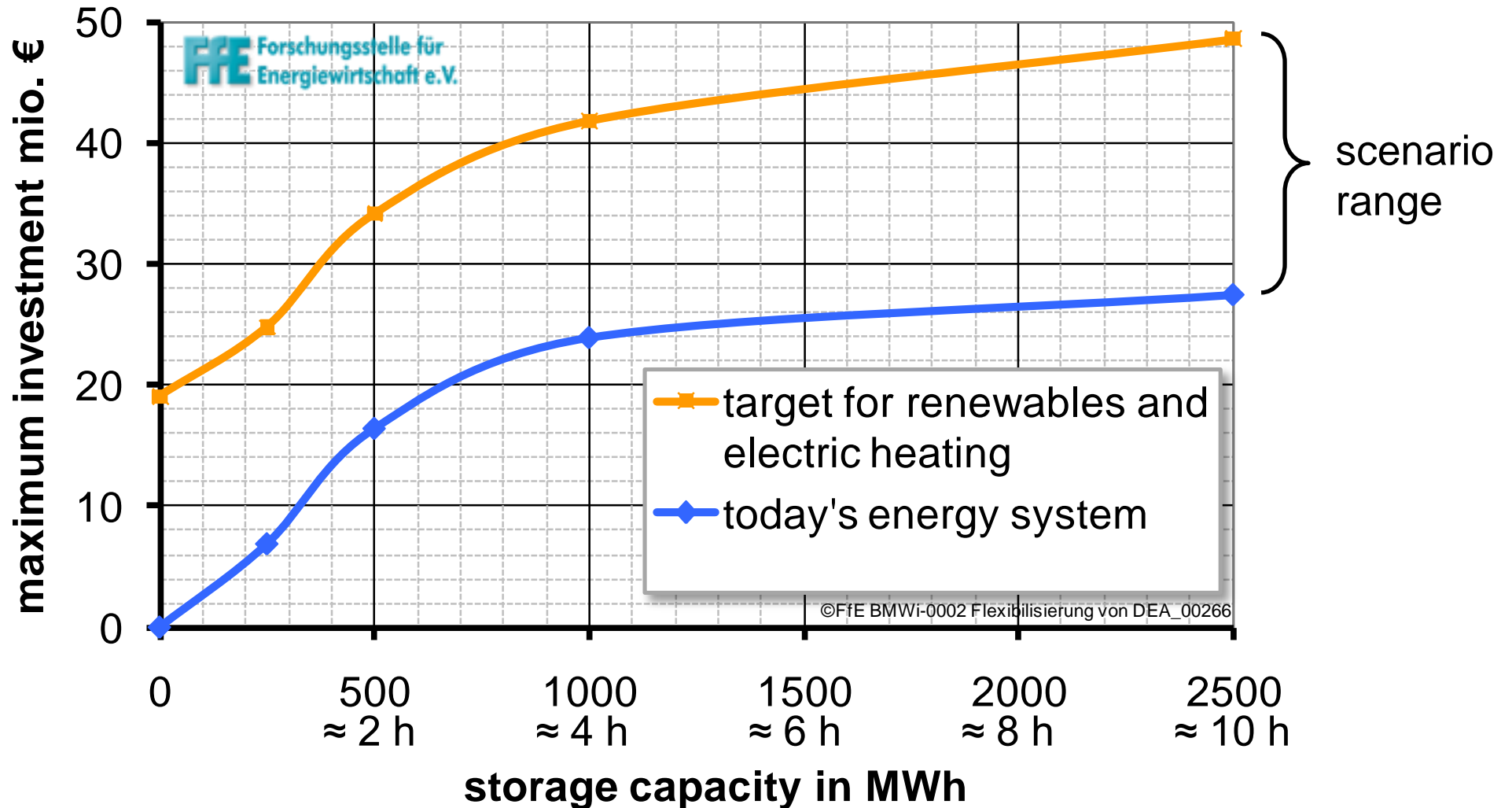


Power to heat ratio = 1

Power loads adapted to a CHP with about 420 MW_{el, max}

- The thermal storage is filled up when the heat demand is lower than the CHP-capacity.
- In times of high heat demand and low electricity prices this heat can be used.
- Thermal storages help to increase the electrical CHP-coverage the more often it can be charged and discharged.

Results of different scenarios with flexible CHP



- Operating CHP more flexible allows additional investment.
- Thermal storage is most effective for a capacity of only a few hours.
- Electrical heating gives additional flexibility.

Summary and Conclusion

- Challenges for Germany's energy system will increase due to high shares of renewable energies and CHP.
- Decoupling of electricity and heat production makes CHP more flexible.
- A flexible operation of CHP is a commercial profitable investment.
- The political targets cannot be reached by making CHP operation more flexible only.
- But the use of extraction condensing turbines combined with thermal storage can substitute conventional peak load power plants.
- Thus fluctuating energy sources can be integrated more efficient and less expensive.

Thank You for Your Attention!

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