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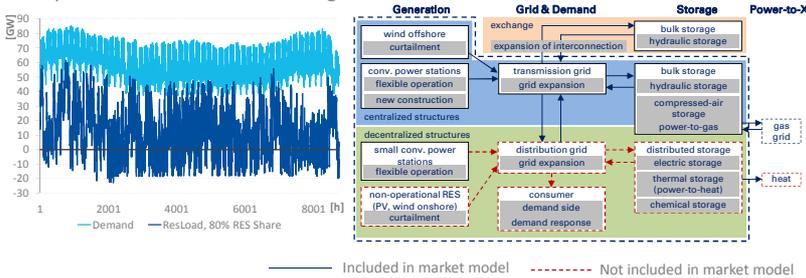


energy
scenarios
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A METHODOLOGY TO INTEGRATE DISTRIBUTION GRID EFFECTS AND DISTRIBUTED FLEXIBLE TECHNOLOGIES INTO MODEL-BASED SYSTEM ANALYSIS OF ELECTRICITY MARKETS

Motivation

- Increasing share of fluctuating renewable energy resources (especially wind & pv) leads to high amplitudes and gradients of residual loads and hence to more requirements for flexible technologies



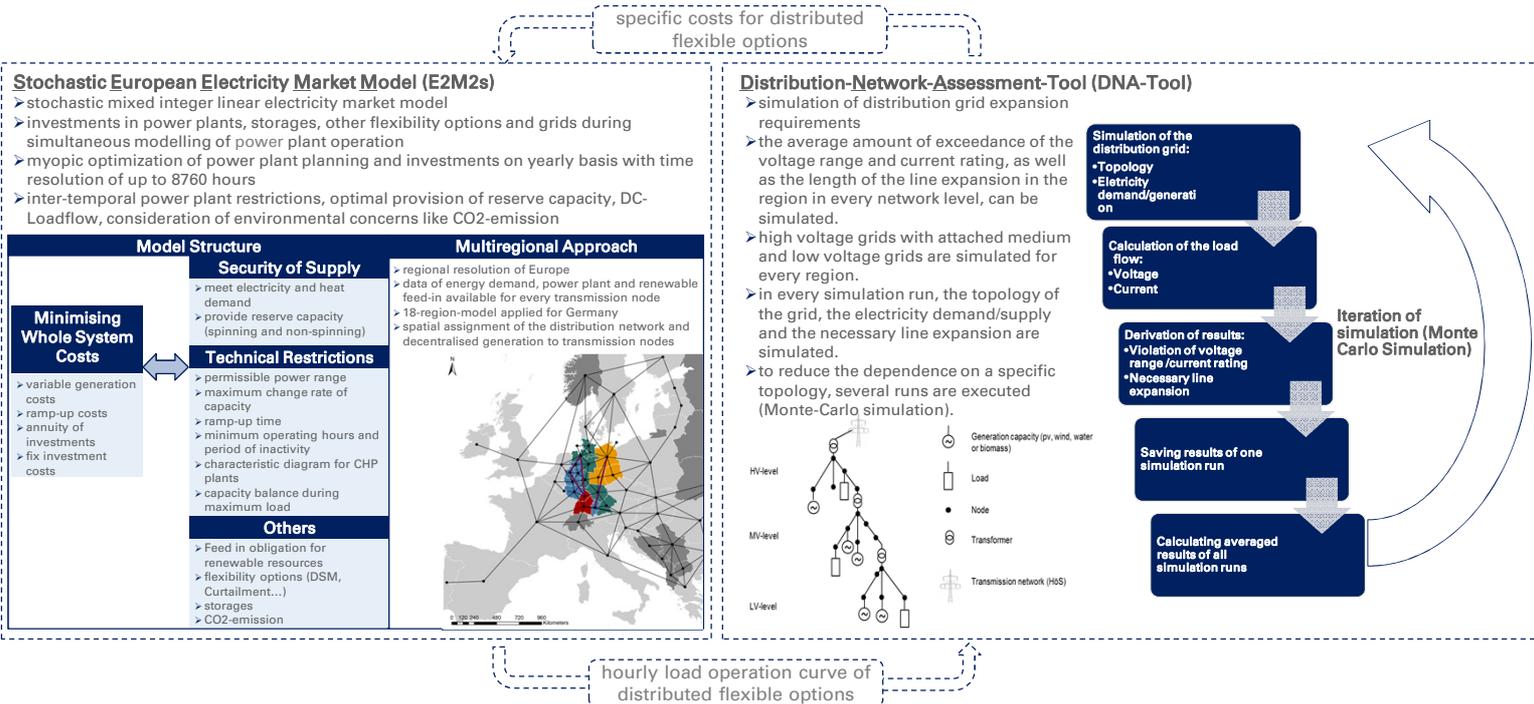
Goal

- Integrating distribution grid expansion into model-based system analysis
- Holistic analysis of flexible technologies on the transmission and distribution grid level
- Determining a cost efficient combination for the electricity system including the power plant and storage operation

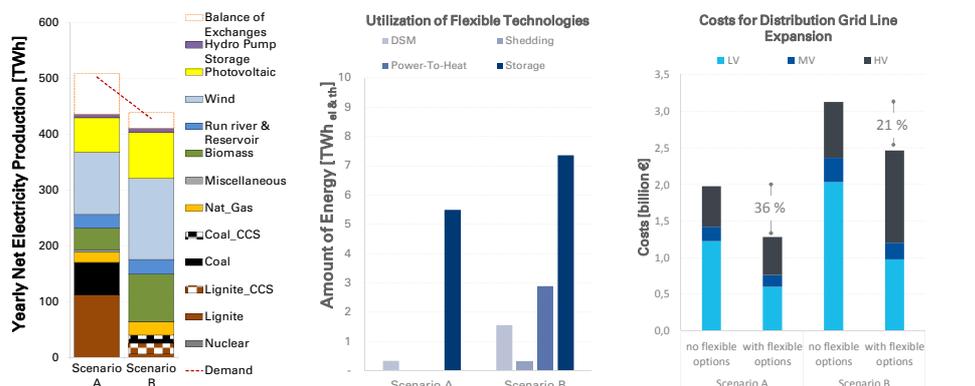
Scenario

- A** 55% CO₂ reduction, 60% renewable energy share
- B** 80% CO₂ reduction, 80% renewable energy share

Methodology



Modelling Results



Conclusion

- gas power plants and CCS become major technologies in the German power plant mix due to strict CO₂ reduction targets
- importance and utilization of flexible technologies increase with higher renewable share, especially storage, DSM and Power-To-Heat
- flexible technologies can help to reduce costs for distribution grid line expansion

References

- Bothor et al., Bedarf und Bedeutung von Integrations- und Flexibilisierungsoptionen in Elektrizitätssystemen mit steigendem Anteil erneuerbarer Energien, 9. IEWT 2015
- Eberl et al., Kosten des Verteilnetzausbaus aufgrund dezentraler Elektrizitätserzeugung – eine simulationsgestützte Betrachtung am Beispiel Baden-Württembergs, Bundesnetzagentur 2013

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