Bundesnetzagentur

Optimization vs. Reality

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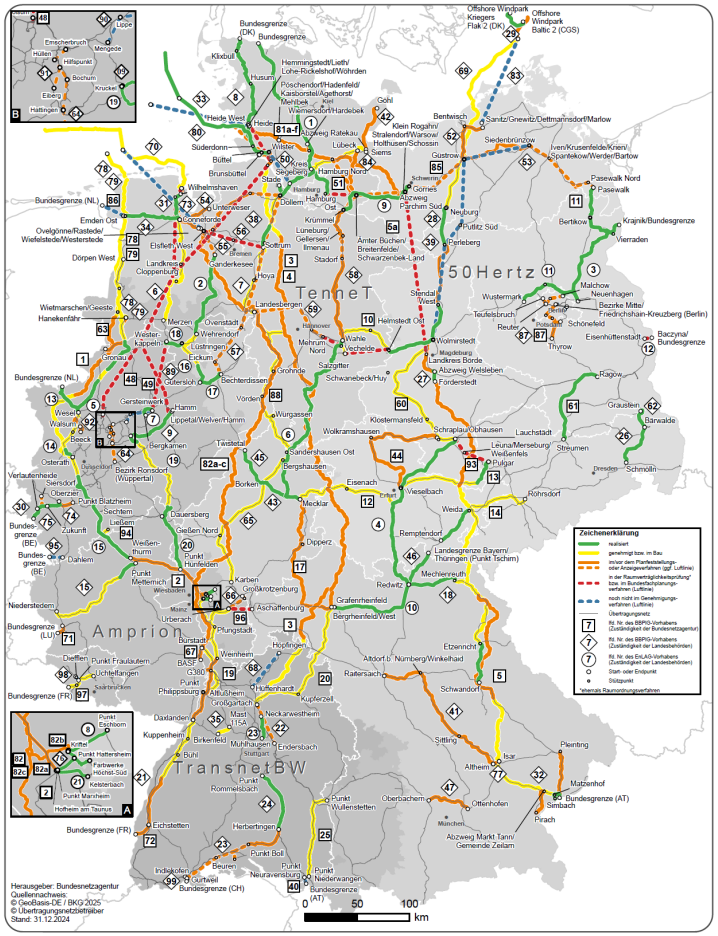
Introduction

Federal Network Agency - Bundesnetzagentur

- The Bundesnetzagentur (BNetzA) is the National Regulatory Authority (NRA) of Germany.
- Independent higher federal authority, assigned to the Federal Ministry for Economic Affairs and Energy
- Mission: promote effective competition in regulated areas and ensure non-discriminatory access to networks
- Overall headcount for all sectors: ca. 3000 staff



Grid Expansion

- „Energiewende“ needs grid expansion
- Huge investments (~300 Mrd. €)
- We care about the „optimal“ solution

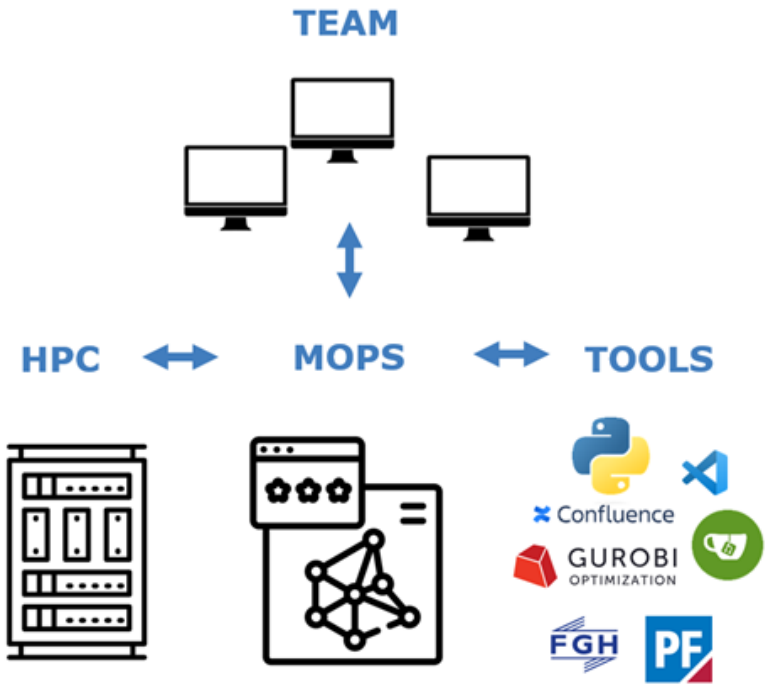
NOVA principle

Grid...

optimization	• Topology measure • Transmission line monitoring
strengthening	• Voltage increase • New lines in existing corridors
extension	• New 380 kV-lines • New substations

Source: BNetzA

Team „Modeling of Power Systems“



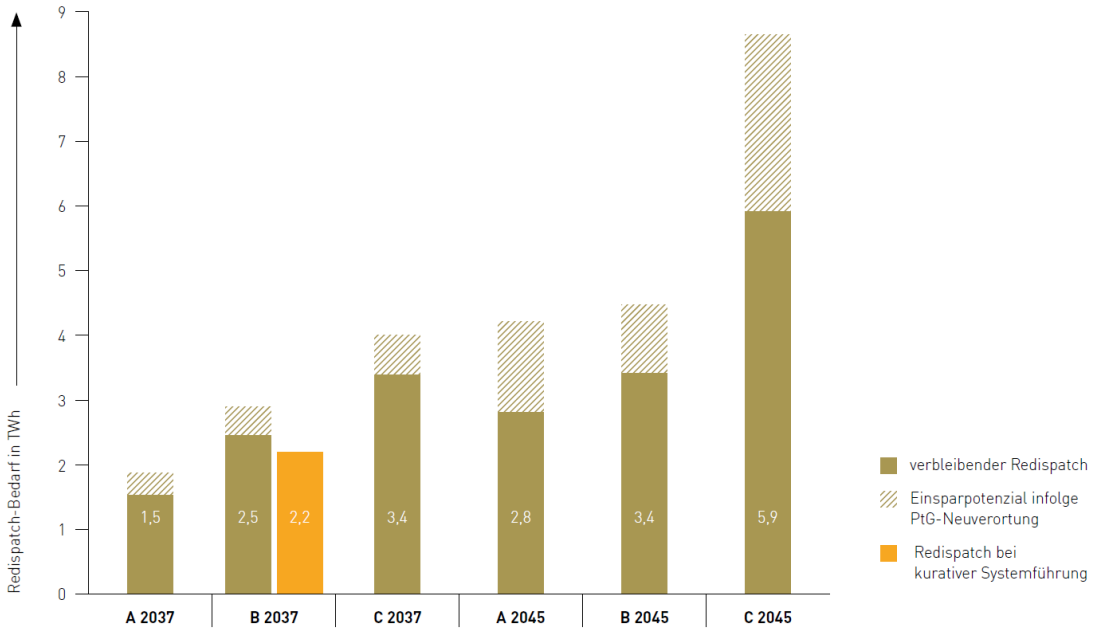
Our **Conception** is „Understanding by doing“. We focus on in-house tool-development

Development of the NDP toolchain & stability analysis. We also host the modeling infrastructure for the energy regulation

We make use of **optimization tools** with different market and energy system models, grid optimization tools and voltage optimizations

Examples

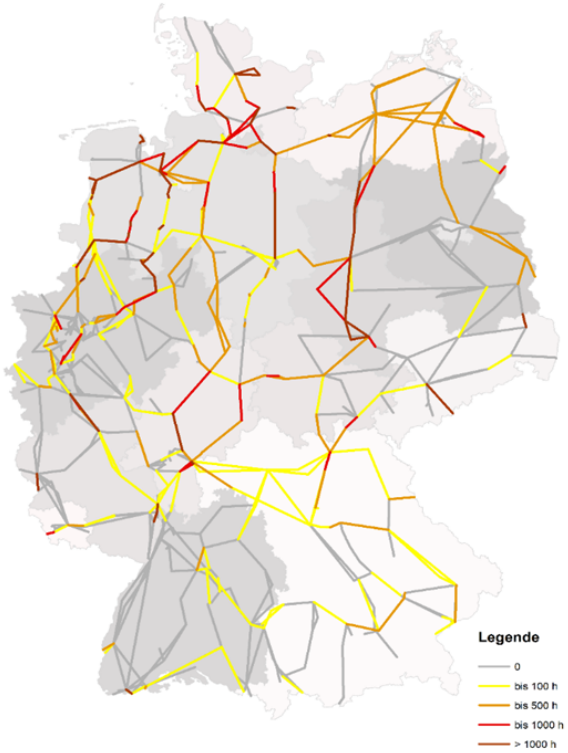
Power-to-Gas relocation in the NDP

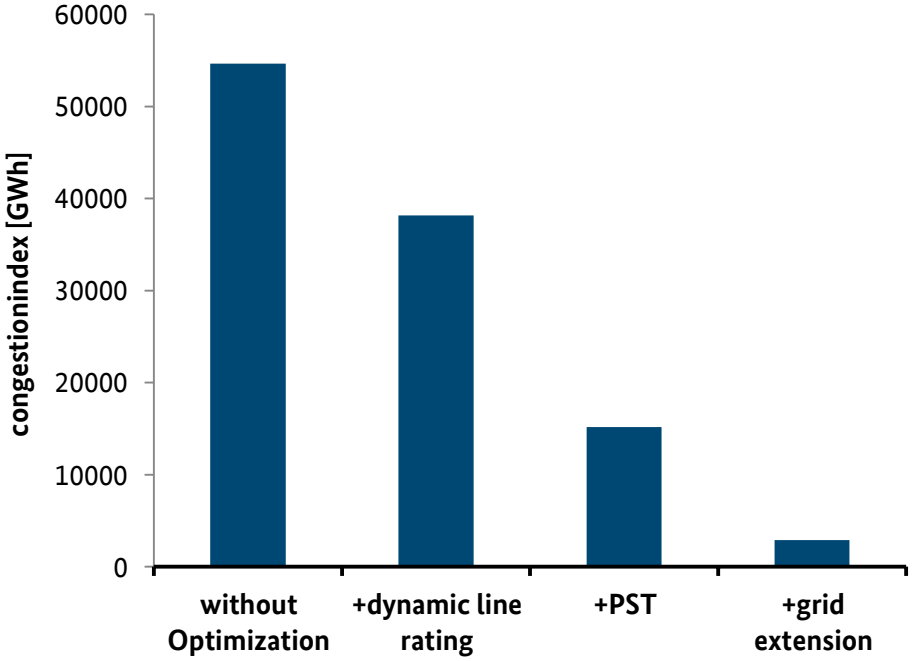


Quelle: Übertragungsnetzbetreiber

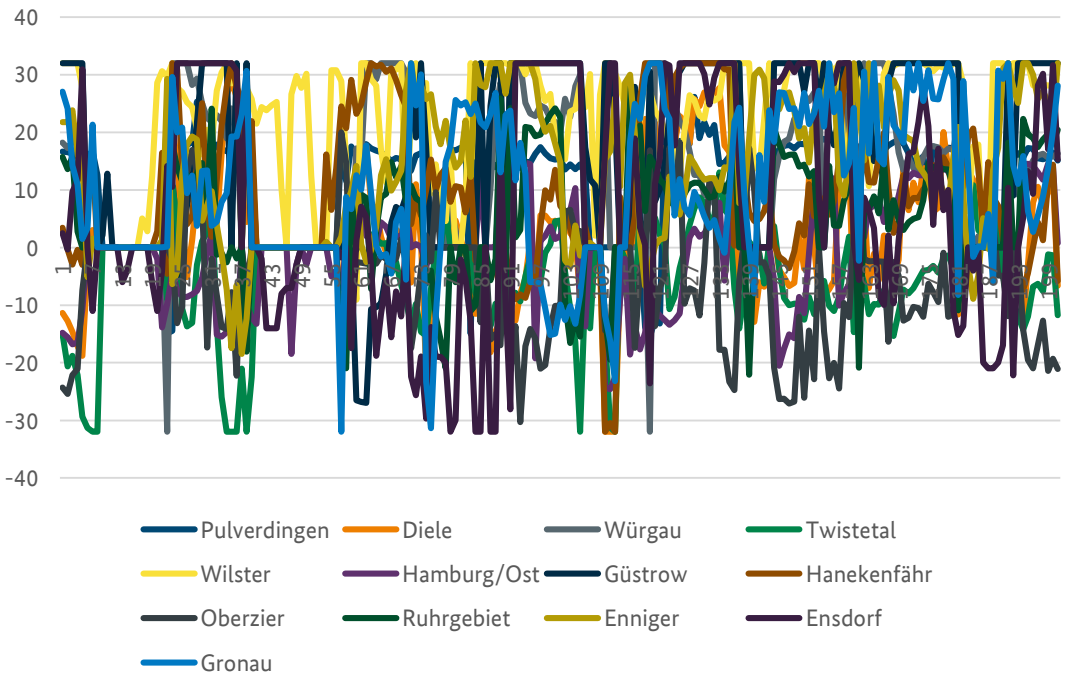
- Optimal PtG locations reduce redispatch volumes
- Could possibly reduce grid expansion needs
- Very little incentives
- Optimum probably not achievable in real world

Powerflow optimization



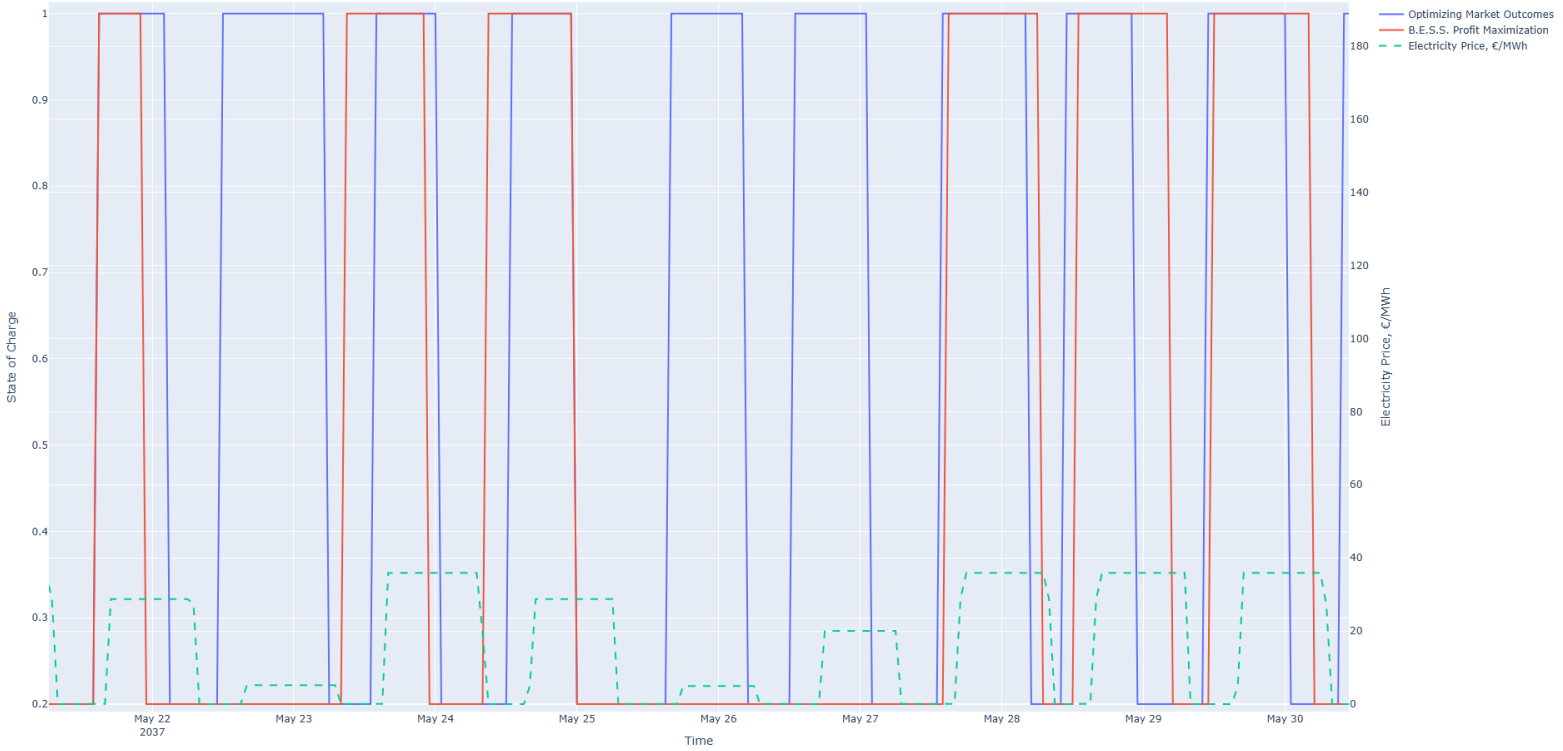


Phase shifter tap positions

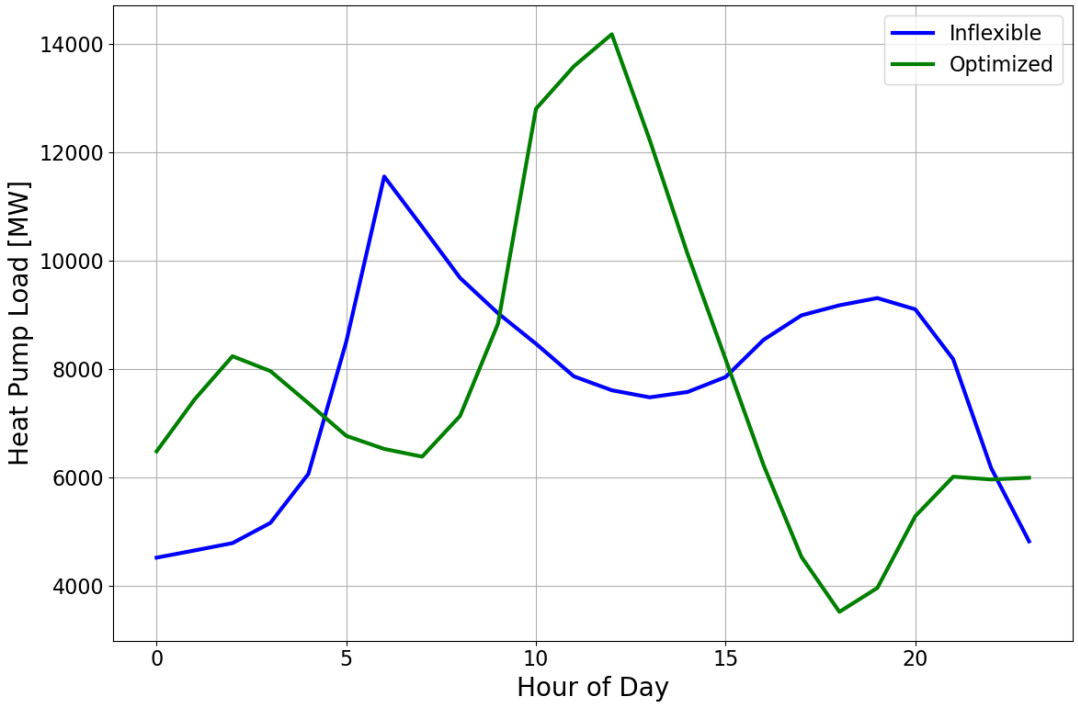


- Optimal solution, but unrealistic in the control room
- Easy to implement additional constraints in model
- Real world probably near optimum

Storage optimization

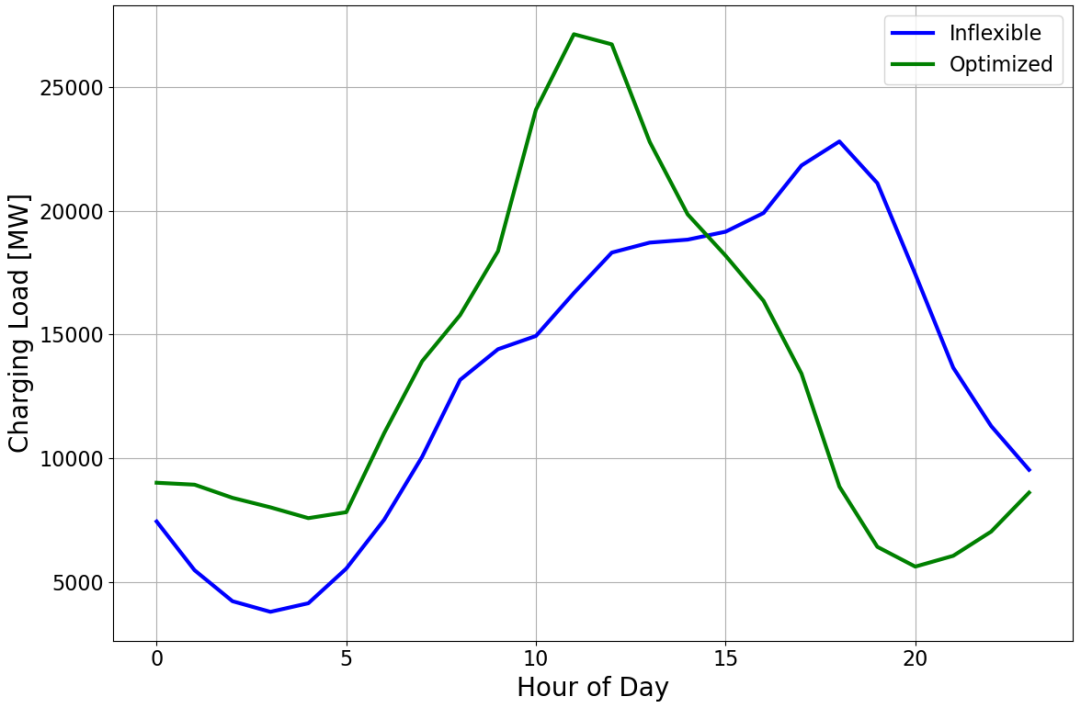


Market Optimization of Heat Pumps



- Heat pumps could follow market signals
- Would invert electrical demand with respect to heat demand
- Little incentives but in theory possible
- Buildings thermally inert enough?

Market Optimization of EV charging



- EV charging could follow market
- Would shift charging peak to mid-day (high solar infeed)
- Are EVs connected to the grid at those times?

Conclusions

Conclusion

We need optimization…

- optimization is an invaluable tool in grid development and energy modeling!
- without optimization, we would not know what we can achieve in theory
- without optimization, we can not test new ideas!

… but

- be careful with the interpretation
- the real world is never optimal
- how much worse is the second best option?
- finding an optimal solution is only the first step!

Kontakt

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