

# Need for rapid results! Ideas for speedy optimisation?

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oemof user meeting




DLR Institute of Networked Energy Systems



Knowledge for Tomorrow



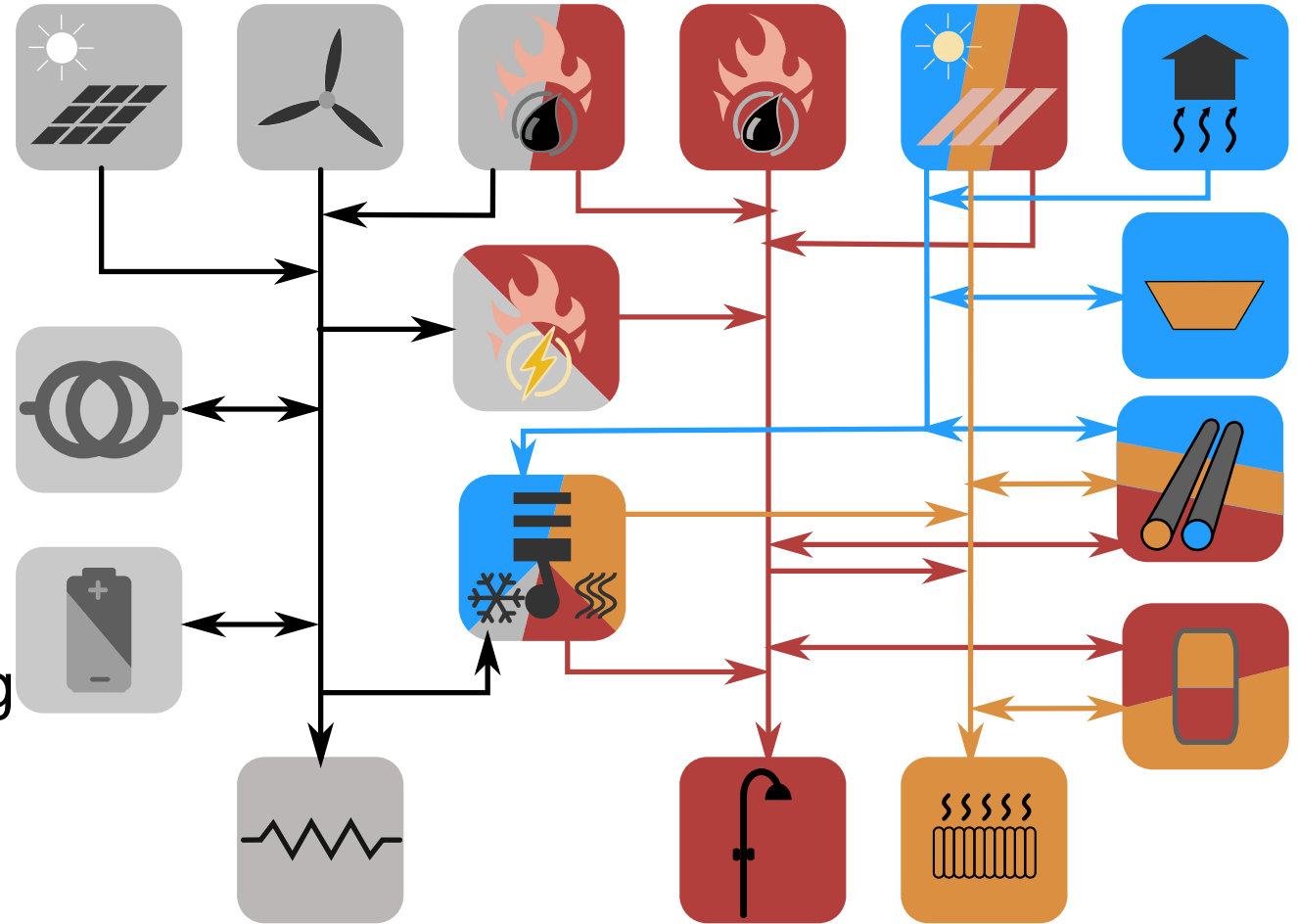
# Motivation

- Complexity of energy system optimisation models and/or analysis 
  - memory demand  computing time 
- Computations could take up to weeks
- Common and transferable methodologies reduce computational time, based on similar characteristics of energy system optimisations.

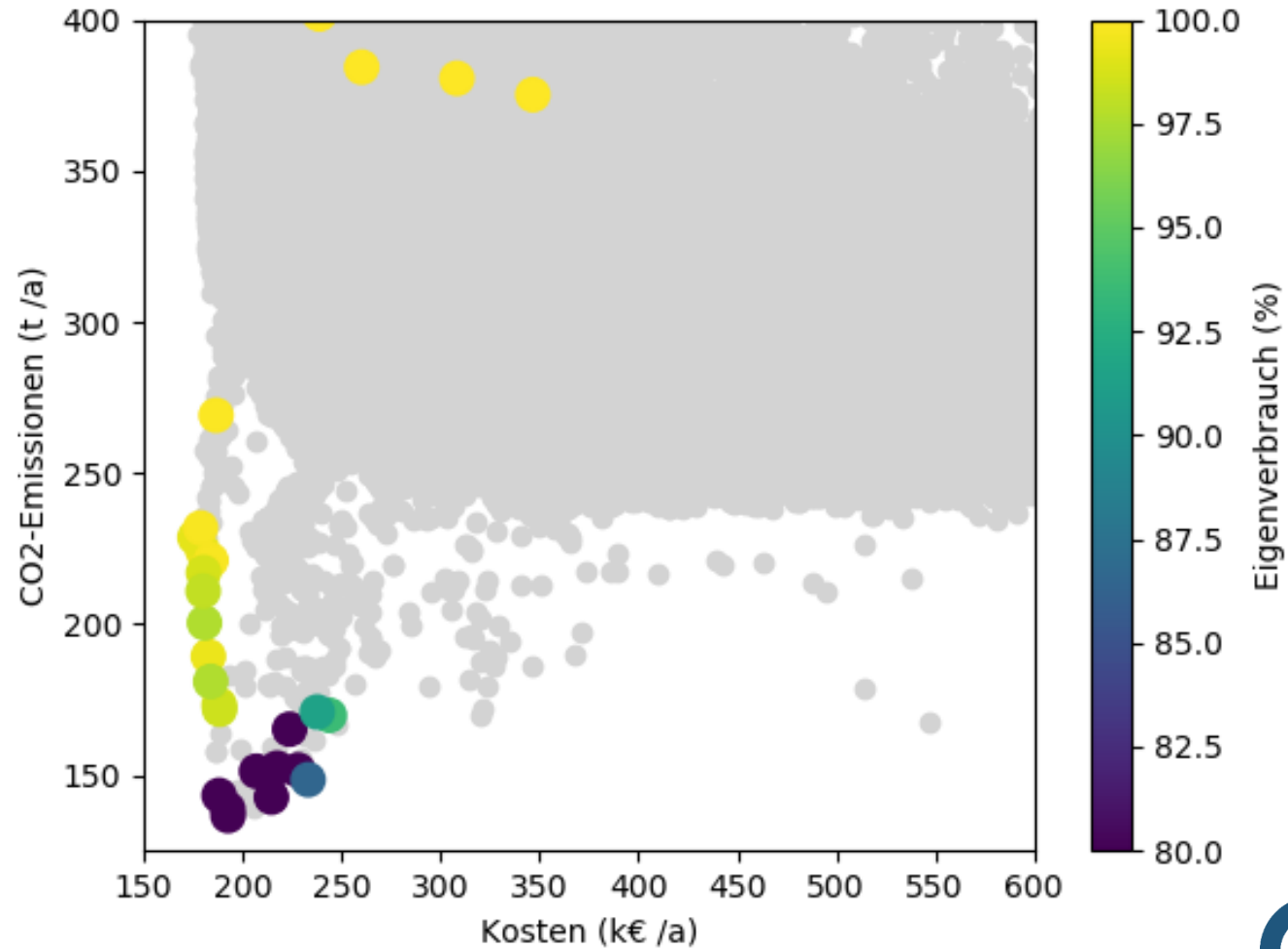


# Model template for residential energy supply systems

- Implemented using oemof.solph & oemof.thermal
- Fixed demands (electricity, heat, DHW)
- Network predefined, techs sized by parameters
- WIP: Connecting locations using electricity and heating grid(s)



# Pareto-optimisation



Design  
Optimisation

ES

Boundary  
conditions

KPI

Operation  
Optimisation

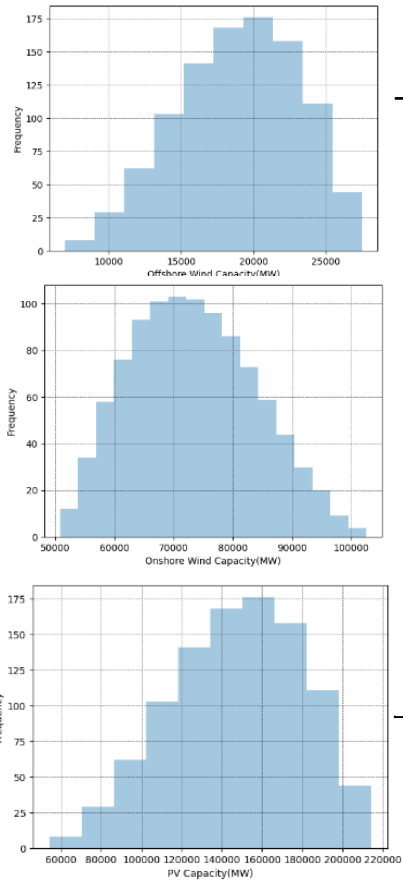


solph ['sɒlv]  
open energy modelling framework



# Use-case B: Monte Carlo Simulation

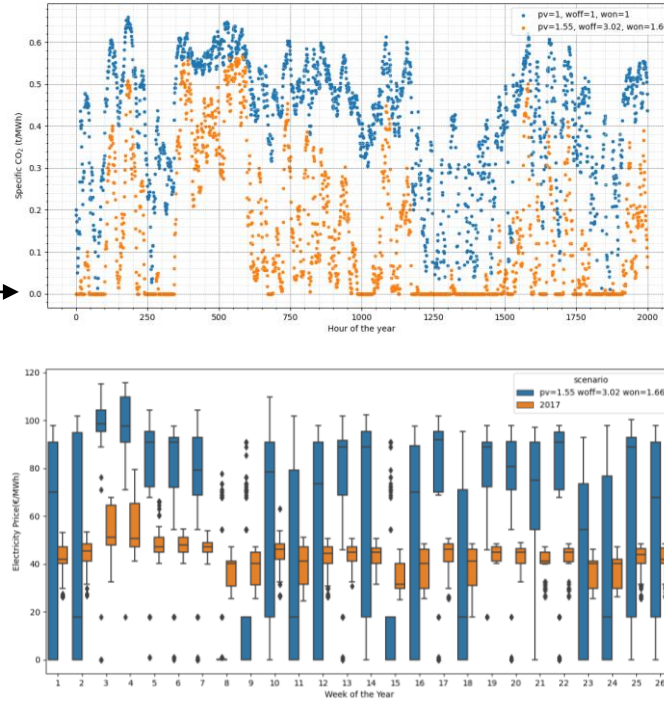
## 2030 input pdf



DEFLEX

National grid model

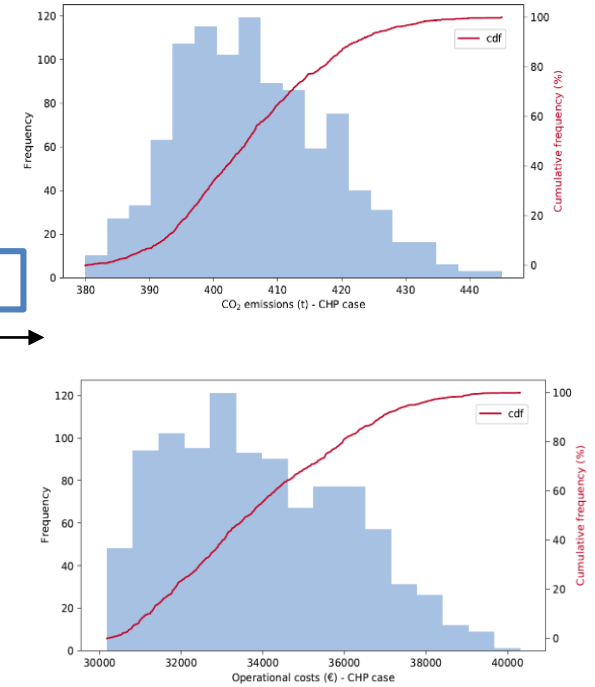
## Intermediate Time Series



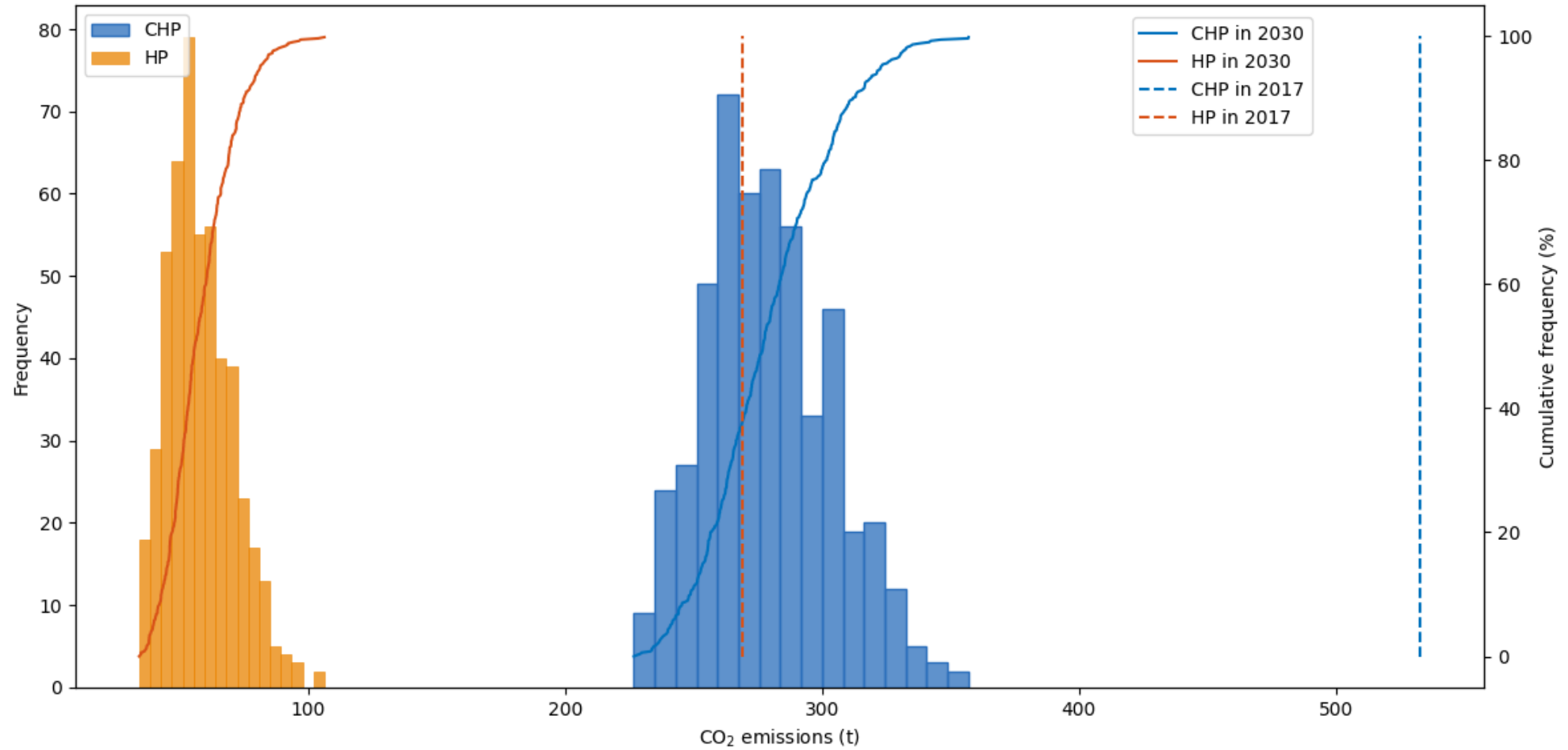
MTRESS

Residential supply model

## 2030 performance pdf



# Example Monte Carlo results



# Overview of Different Methodologies

Methodology	Brief Description	Problems
Time Slicing	Focusing on a specific section of time	<ul style="list-style-type: none"> <li>Significant deviations of the results compared to the global optimum of full optimisation</li> </ul>
Spatial Aggregation	Reducing spatial fidelity of the model	<ul style="list-style-type: none"> <li>Pre-calculation for majority of network equivalents of the model could be time costly, if this data is not available.</li> </ul>
Temporal Aggregation	Down sampling of highly detailed data set	<ul style="list-style-type: none"> <li>Hard to capture the dynamic behaviour of the renewable energy power outputs</li> <li>No clear best practice</li> </ul>
Technological Aggregation	Reducing technological modelling accuracy	<ul style="list-style-type: none"> <li>No clear best practice</li> </ul>
Rolling Horizon	Solving smaller individual time slices sequentially	<ul style="list-style-type: none"> <li>Hard to account for long term variables or constraints</li> <li>May not meet the global optimum of the original problem</li> </ul>
Temporal Zooming	Time slices optimised using info from coarser time scale optimisation.	<ul style="list-style-type: none"> <li>Requirement for an additional model run</li> <li>May not be as fast as rolling horizon</li> </ul>



# Conclusions

- Need for quicker optimisation because of broader analysis or more complicated energy system optimisation
  - Various options to reduce the computational time
  - Each of them have their drawbacks
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- Did you experience a need to speed up your optimisation?
  - What difficulties did you experience and how did you overcome these?

**Thank you for your attention!**

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