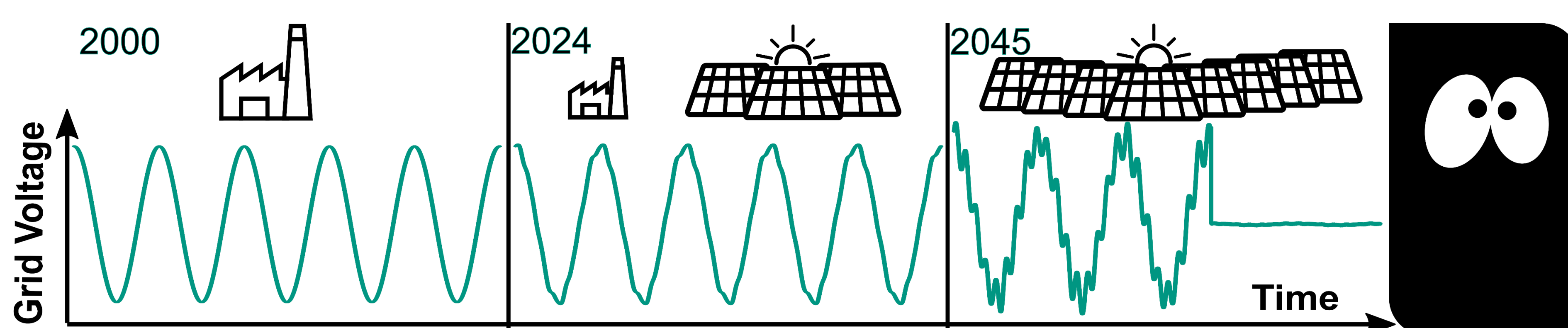


Master Thesis / Bachelor Thesis

Ambivalent Photovoltaics – From Rooftop to PV-Field

Scientific Title: Analysis of Voltage and Current Waveform Distortions in Different Photovoltaic Systems

Our electrical power grid faces major changes in order to realize the energy transition towards renewable generation. For example, large central power plants are replaced by many widespread generators such as photovoltaics and wind turbines. This can cause issues with power quality and security of supply [1, 2].



This thesis aims to extract correlations between photovoltaic power and waveform distortions of the distribution grid voltage. The data was measured with our in-house developed electrical data recorders (EDR [3]). Analysis of data from our rooftop PV plant are already in progress. In the next step we want to compare them with data from a larger-scale PV-Field. Do behaviors match?

This sounds exciting? Then get in touch!

The proposed thesis consists of the following parts:

- The data you will work with is already available. The task focuses on the data analysis.
- Familiarization: Data, correlation analysis (Spearman, Pearson).
- New data: Application of the analysis routine.
- Identification: Similarities and differences in the results.
- Extension for Master thesis: Explain observed similarities and differences.

We are happy to answer any questions you might have. Feel free to ask for an appointment or just give us a call!

Die Arbeit darf natürlich auch in deutscher Sprache geschrieben werden.

References

- [1] DIN EN 50160:2020-11 „Merkmale der Spannung in öffentlichen Elektrizitätsversorgungsnetzen; Deutsche Fassung EN 50160:2010 + Cor.:2010 + A1:2015 + A2:2019 + A3:2019“
- [2] Li, C. “Unstable Operation of Photovoltaic Inverter From Field Experiences,” *IEEE Transactions on Power Delivery*, 2018, 33(2), 1013–1015. <https://doi.org/10.1109/TPWRD.2017.2656020>
- [3] Maass, H., Cakmak, H. K., Bach, F., & Kuhnappel, U. G. (2014). “Preparing the electrical data recorder for comparative power network measurements,” *2014 IEEE International Energy Conference (ENERGYCON)*, 759–765. <https://doi.org/10.1109/ENERGYCON.2014.6850511>

Advisor:

Ellen Förstner, M. Sc.

Programming language:

Matlab

System, Framework(s):

Windows

Required skills (Wish list):

- Student of computer science or mechanical engineering
- Prior experience in Matlab programming and data analysis (e.g. lecture, Hiwi)

Language(s):

German, English

Starting date:

As soon as possible

For more information, please contact:

Ellen Förstner

Phone: +49 721 608 26918

E-Mail: ellen.foerstner@kit.edu

Institute for Automation und Applied Informatics (IAI)
Karlsruhe Institute of Technology,
Campus North
Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen