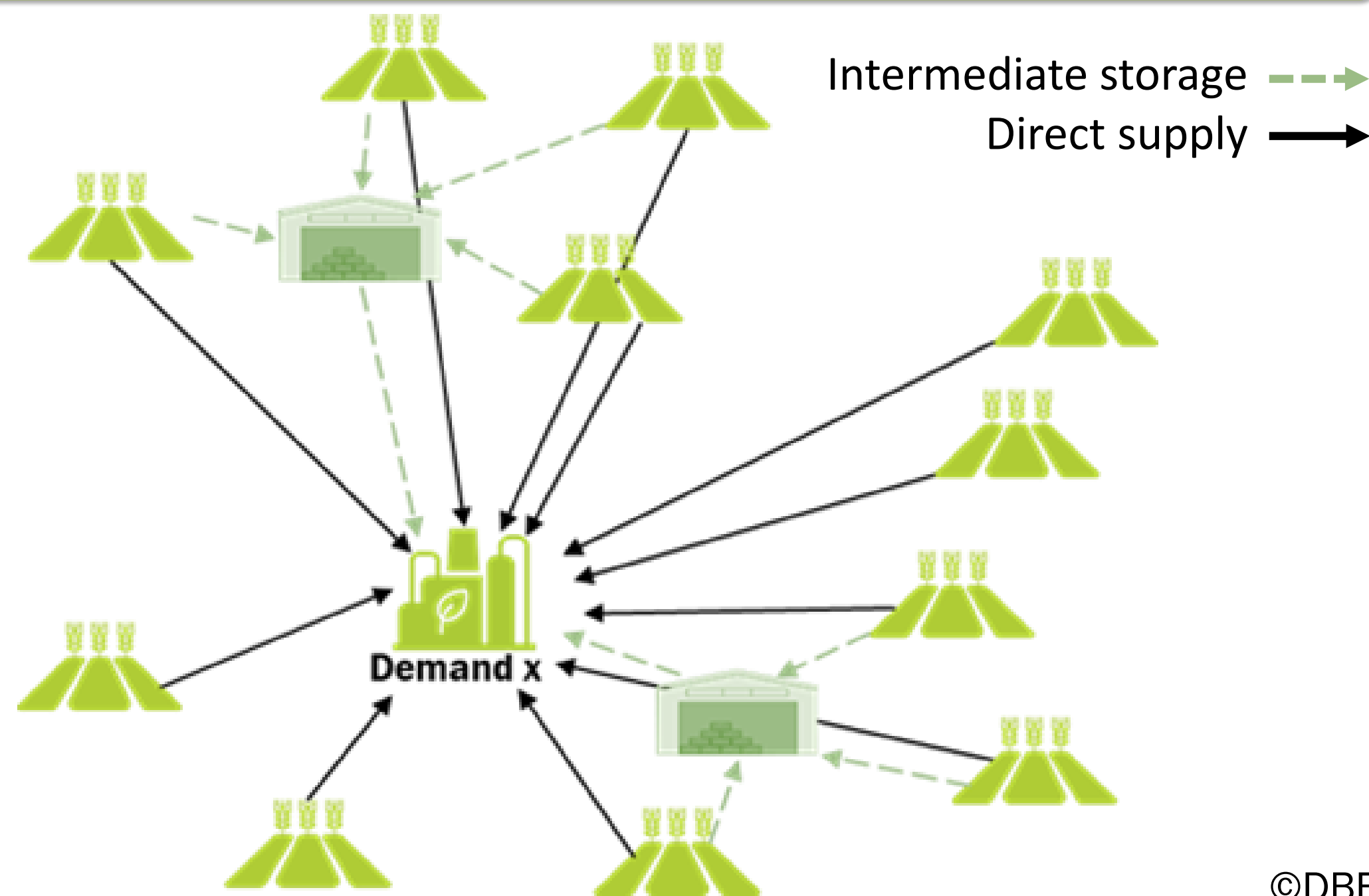




Optimisation of straw supply: Influence of supply chain design on total logistics costs

Tom Karras¹, Daniela Thrän^{2,3}

Schematic view of the optimisation approach

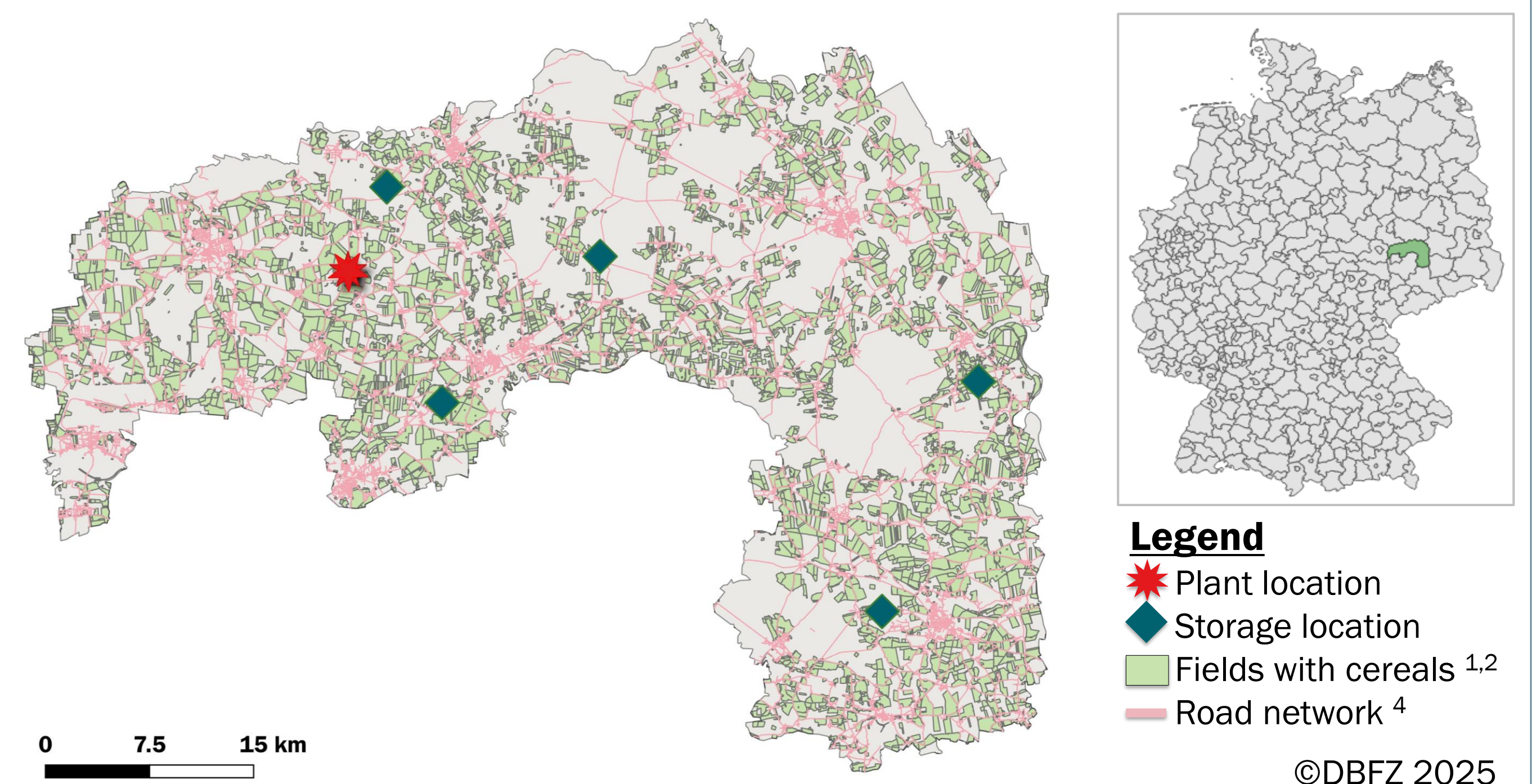


©DBFZ 2025

Objective

- Linear optimisation model to calculate logistic costs for straw supply from pool of fields to a predefined demand side.
- 2 Options: **Option A** = only direct supply
Option B = intermediate storage options

Input settings for region of interest

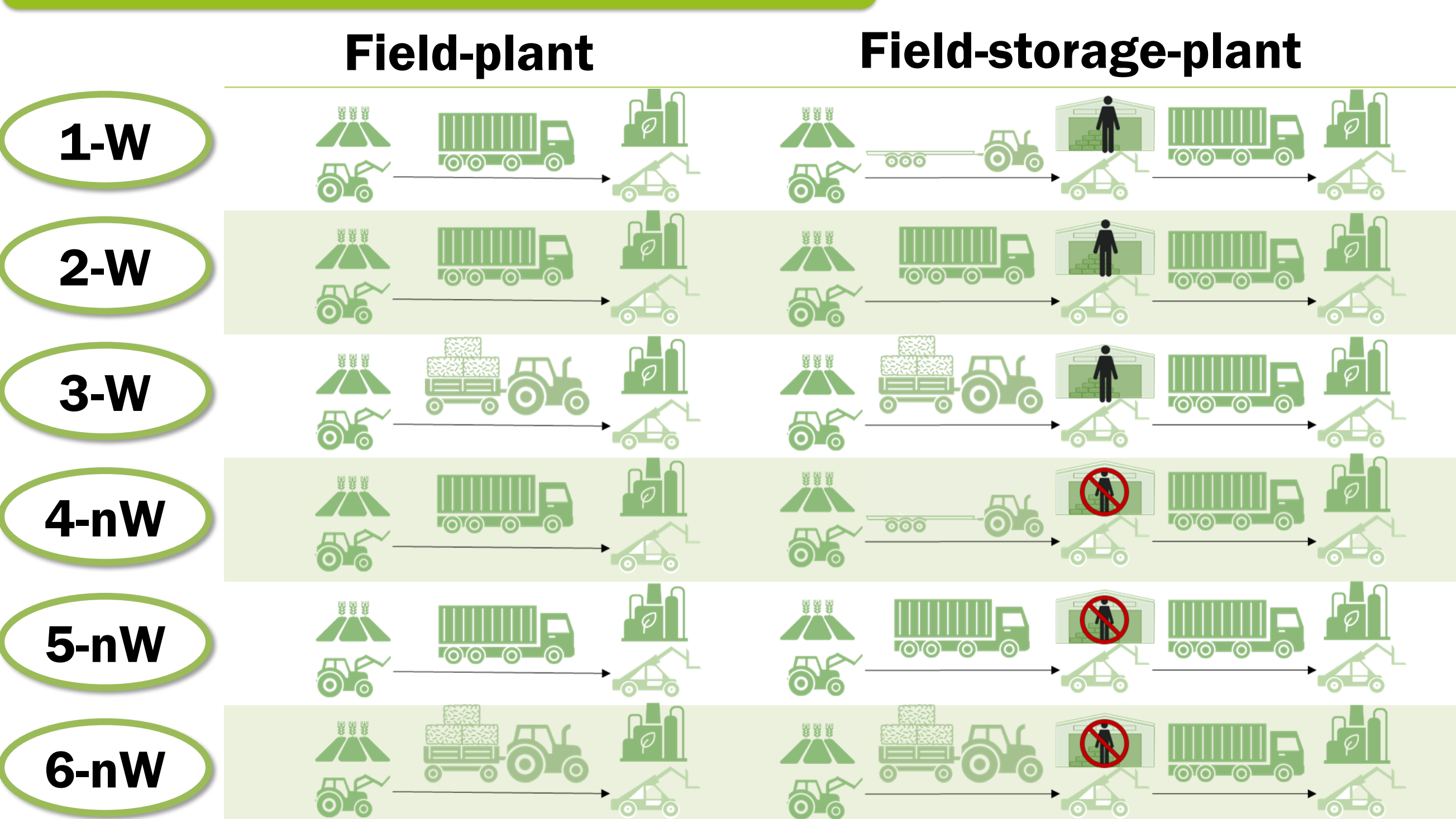


©DBFZ 2025

Input data

- Field locations extracted from Thünen Crop map ^{1,2}
- Straw yields adjusted from Resource data base (DBFZ) ³
- Road network based on Basis-DLM from 2018 ⁴
- Cost for Logistics mainly from KTBL ⁵
- In total: 1 demand side (plant), 5 storages, 1926 fields

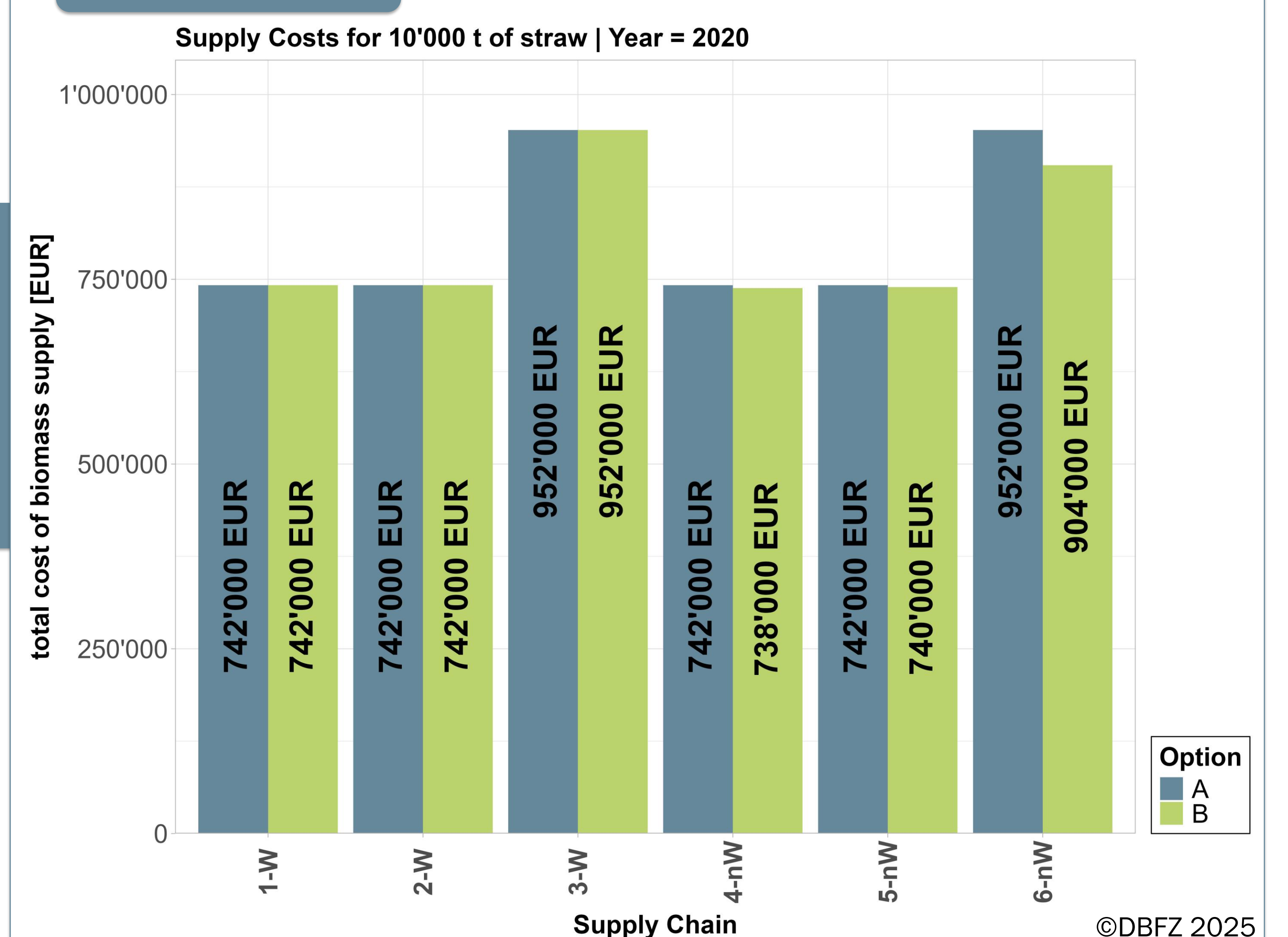
Selection of Supply Chains



Supply chain design

- 3 transport modes available:
tractor + tipper | tractor + platform trailer | truck + trailer
- 2 levels for storage costs
👤 wage for worker included | 🚫 no worker included

First results



©DBFZ 2025

Conclusion

- Assumptions about storage cost highly influence the choice of including intermediate storage options
- Transport mode mainly influence the total logistic costs, but not essentially the choice for selecting storage options

References

- 1) G. O. Tetteh, A. Gocht, S. Erasm, M. Schwieder and C. Conrad, "Evaluation of Sentinel-1 and Sentinel-2 Feature Sets for Delineating Agricultural Fields in Heterogeneous Landscapes," in IEEE Access, vol. 9, pp. 116702-116719, 2021, <https://doi.org/10.1109/ACCESS.2021.310590>.
- 2) L. Blickensdörfer, M. Schwieder, D. Pflugmacher, C. Nendel, S. Erasm, P. Hostert, "Mapping of crop types and crop sequences with combined time series of Sentinel-1, Sentinel-2 and Landsat 8 data for Germany", in Remote Sensing of Environment, Volume 269, 2022, <https://doi.org/10.1016/j.rse.2021.112831>.
- 3) F. Naegeli de Torres, R. Brödner, K.-F. Cyffka, A. Fais, J. Kalcher, S. Kazmin, R. Meyer, K. S. Radtke, F. Richter, M. Selig, B. Wilske, D. Thrän, "DBFZ Resource Database: DE-Biomass Monitor. Biomass Potentials and Utilization of Biogenic Wastes and Residues in Germany 2010-2020" [Data set]. Zenodo, 2023, <https://doi.org/10.5281/zenodo.10370137>.
- 4) Landesamt für Geobasisinformation Sachsen (GeoSN), Digitales Basis-Landschaftsmodell, dl-de/by-2-0, 2018.
- 5) Kuratorium für Technik und Bauwesen in der Landwirtschaft (KTBL), "KTBL-Datensammlung - Betriebsplanung Landwirtschaft 2020/21, 2020, Darmstadt, ISBN 978-3-945088-74-6.