

Master Thesis

Spatial Analysis of Agri-PV Integration for Biorefinery Applications

■ Background

The green transition is driving investments in renewable energy and sustainable production systems. **Biorefineries** are an important part of this transition, as they convert biogenic raw materials into valuable products such as fuels, chemicals, and materials. However, land-use competition is intensifying while agricultural production remains emissions heavy. **Agrioltaic** (Agri-PV) systems can contribute to meeting the electricity and heat demand of biorefineries while preserving agricultural production. To harness the full potential of renewable energies for the agricultural sector and for decarbonising biorefinery production, the potential for integrated PV systems needs to be estimated. The use of geospatial data will allow to depict the various location specific factors such as land use and infrastructure connectivity suitable for biorefineries and Agri-PV.

■ Objectives of the thesis

The goal of this thesis is to assess the potential of Agri-PV systems in the context of biorefineries by applying **Geographic Information Systems (GIS)**. The thesis will **estimate the spatial potential** of Agri-PV and relate it to the land demand and renewable energy needs of the biorefinery concept. Based on recent insights from an **existing study and scientific literature**, relevant biorefinery concepts, agricultural land-use systems, and criteria for Agri-PV suitability are to be consolidated. This will enhance the existing GIS-approach used to **identify and map suitable areas** for Agri-PV deployment in the region of a selected biorefinery case study. In addition, the thesis may **evaluate selected system designs** with regard to the compatibility of Agri-PV and biorefinery concepts. Ideally, for a given set of assumptions on the system, the analysis would allow to determine the coverage required to satisfy existing biorefinery's energy demand and estimate the wider regional energy production potential of the solar systems. Finally, the results will be discussed from an economic and practical perspective, including possible **business models** and the general viability of Agri-PV integration for biorefinery businesses.

■ Requirements

- Interest in renewable energy, biorefineries, and sustainable production systems
- Interest in GIS, techno-economic and land-use analysis
- Willingness to work independently
- Ideally, some experience with literature research, Excel, or basic modelling tools

■ Start date/duration/language

Thesis can start immediately / 6 months / English required

■ Contact persons

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