**Final Thesis**

# Development of an agent-based model for investigating the heat and CO₂ requirements of greenhouses

**Contents:**

Biogenic $CO_2$ is needed as a carbon carrier in power-to-X applications and for $CO_2$ fertilization in greenhouses. In order to replace the predominantly "fossil" $CO_2$, the OxyGreenCO$_2$ research project is investigating the provision of "green" $CO_2$ from biogenic solid fuels using oxyfuel combustion. The $CO_2$ can be separated from the flue gas using a partial condenser. The waste heat and condensation heat from oxyfuel combustion can also be used to heat greenhouses. The oxygen required for oxyfuel combustion is produced as a by-product of water electrolysis.

In order to evaluate the economic efficiency and the interaction between the greenhouse's $CO_2$ and heat requirements and the electricity price-dependent supply of oxygen from electrolysis, an initial agent-based plant model is to be developed as part of the thesis. The software Anylogic will be used for this purpose. In a next step, the plant model created will be used to identify important parameters that influence the costs of heat and $CO_2$ supply.

**Tasks:**

- Literature research on the topics of agent-based simulation, electricity price-dependent oxygen supply from electrolysis, current and future $CO_2$ costs
- Development of an agent-based plant model using Anylogic software
- Identification of parameters that affect the costs of heat and $CO_2$ supply for a greenhouse
- Written documentation of the work, presentation of the results

**Requirements:**

- Structured and independent working style
- Independent familiarization with the software Anylogic
- Working language: German or English

**Start:** February/March 2026

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