



# Optimizing the use of a TDLAS- WindTrax-combination to quantify methane emission rates of biogas plants

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**IBBA Methane emission workshop**

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- Methane emission quantifying method
  - Concentration measurement
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- Biogas plant, experimental setup
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# QuantiSchluMBF

- Increase of fermentation in biogas plants in Germany
- Greenhouse gas emissions of biogas plants, especially methane slip could be higher than assumed
- Previous monitoring campaigns were rare, complicated and vague
- A measurement method is crucial to evaluate the methane slip of the whole plant and the lost potential
- The aim of the project is to further develop the used method and establish it for broad usage



# The method consists of three components

**1. Concentration measurement [ppm]**

**2. Wind measurements**

**Site details**  
(sensor position,  $c_b$ ,  $p$ )

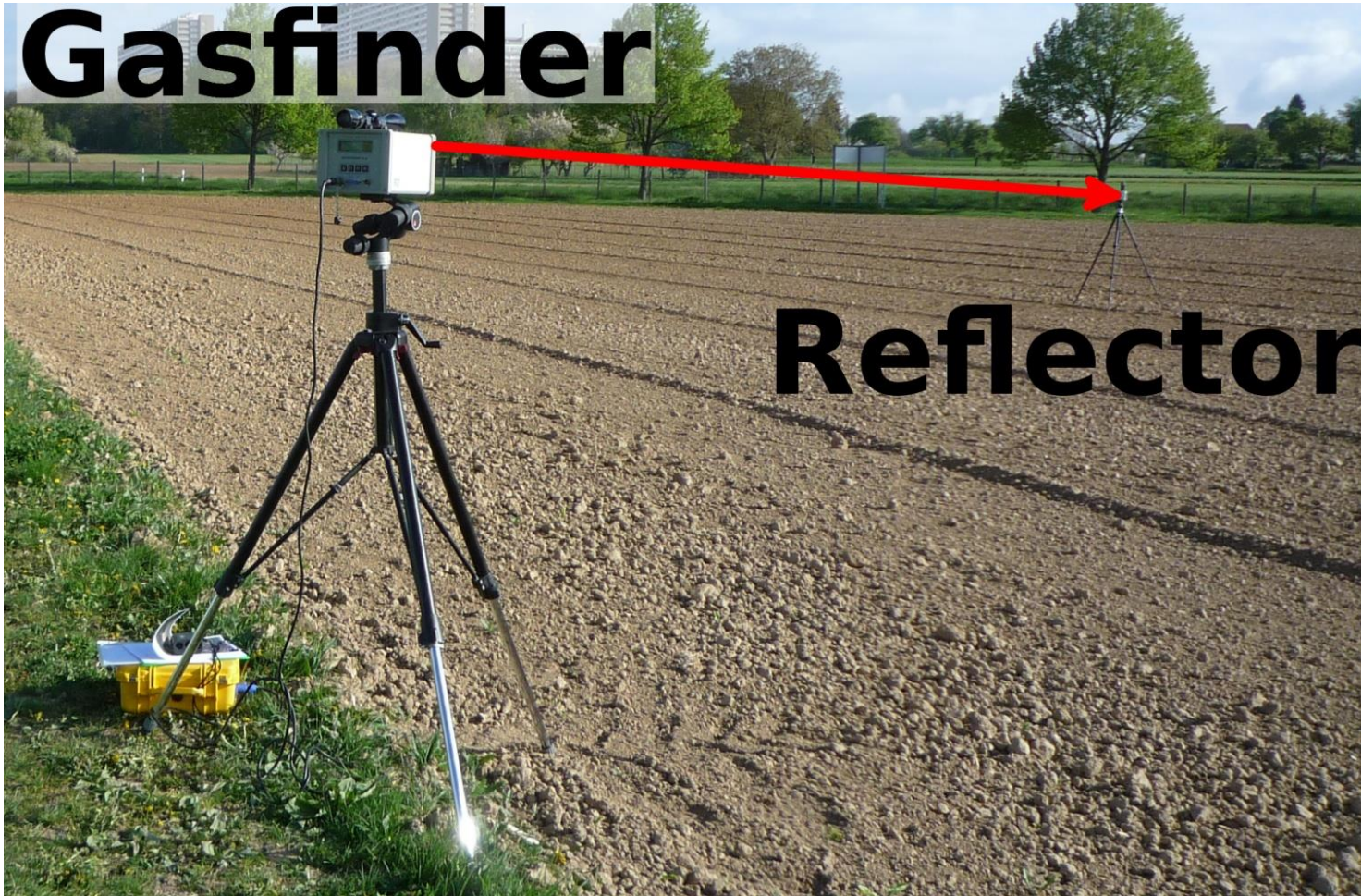
**3. Simulation**

**Emission rate [g/s]**



# Methane concentration measurement

**Gasfinder**



**Reflector**



# Wind measurements

<http://www.iswa.uni-stuttgart.de>

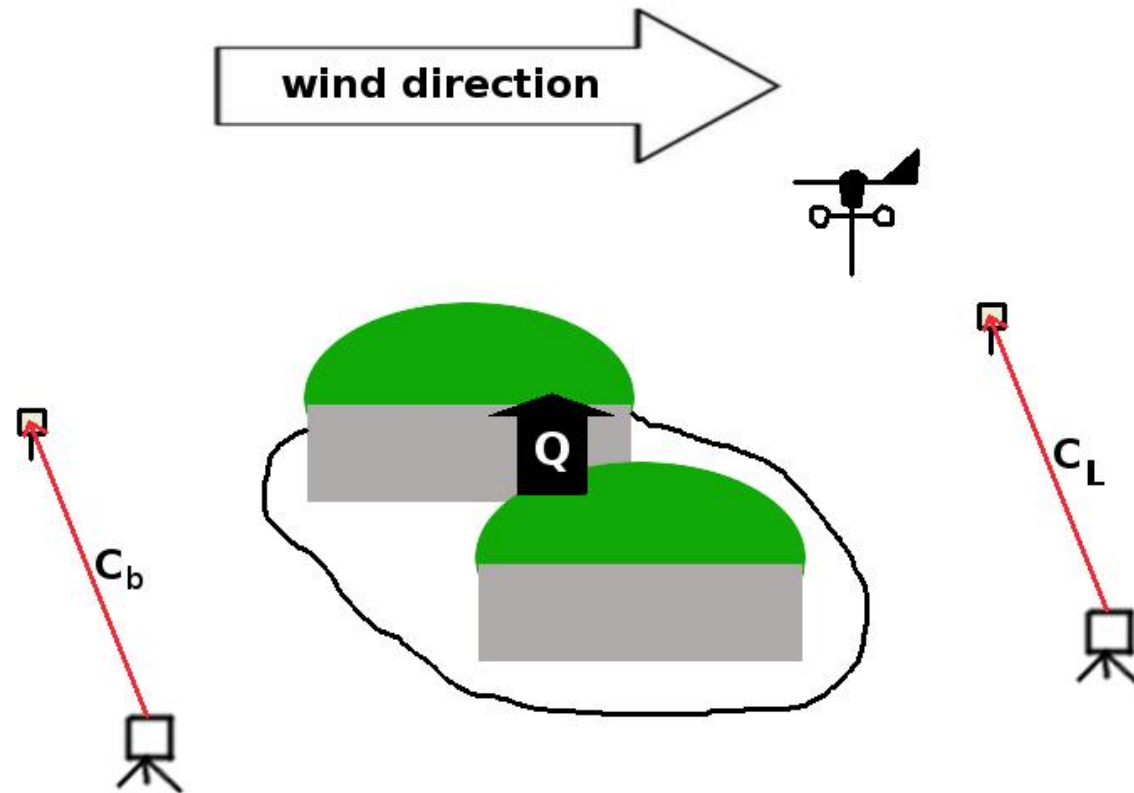


A. Groth: Quantifying methane emission rates of biogas plants.

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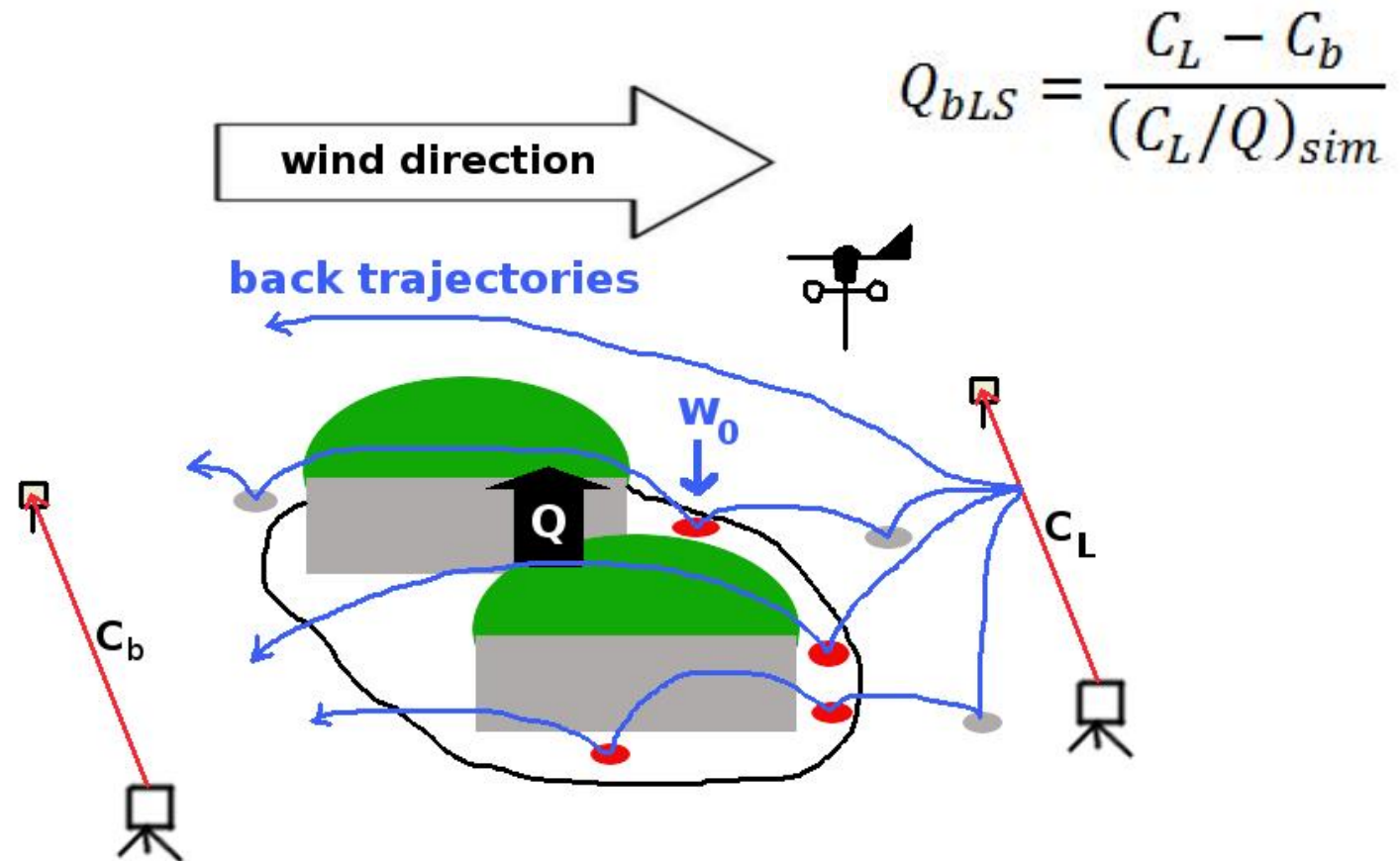


# Dispersion modeling: Positioning and measurements





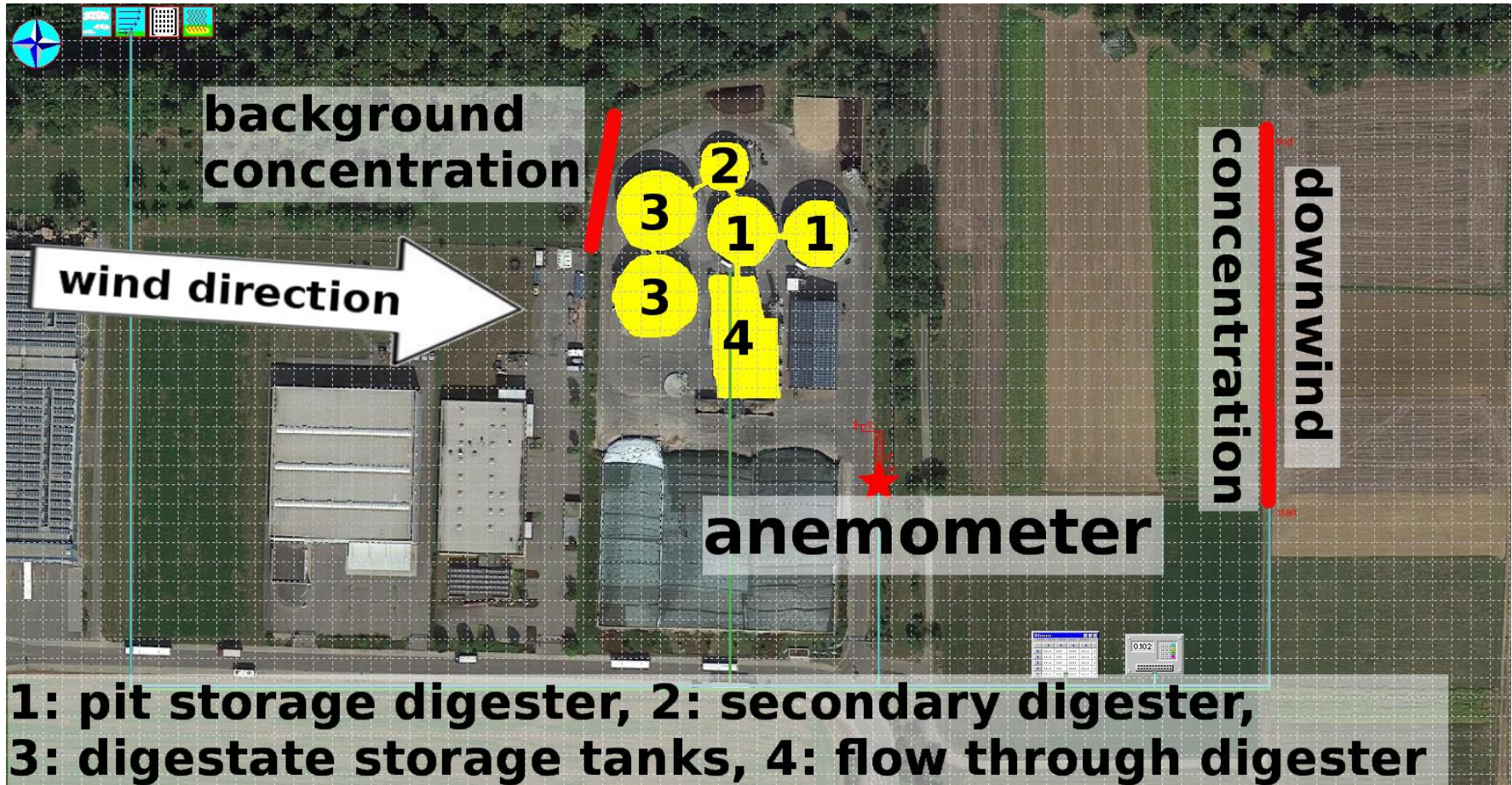
# Dispersion modeling: Backwards Lagrangian stochastic (bLS)







# Experimental setup on site



<http://www.iswa.uni-stuttgart.de>

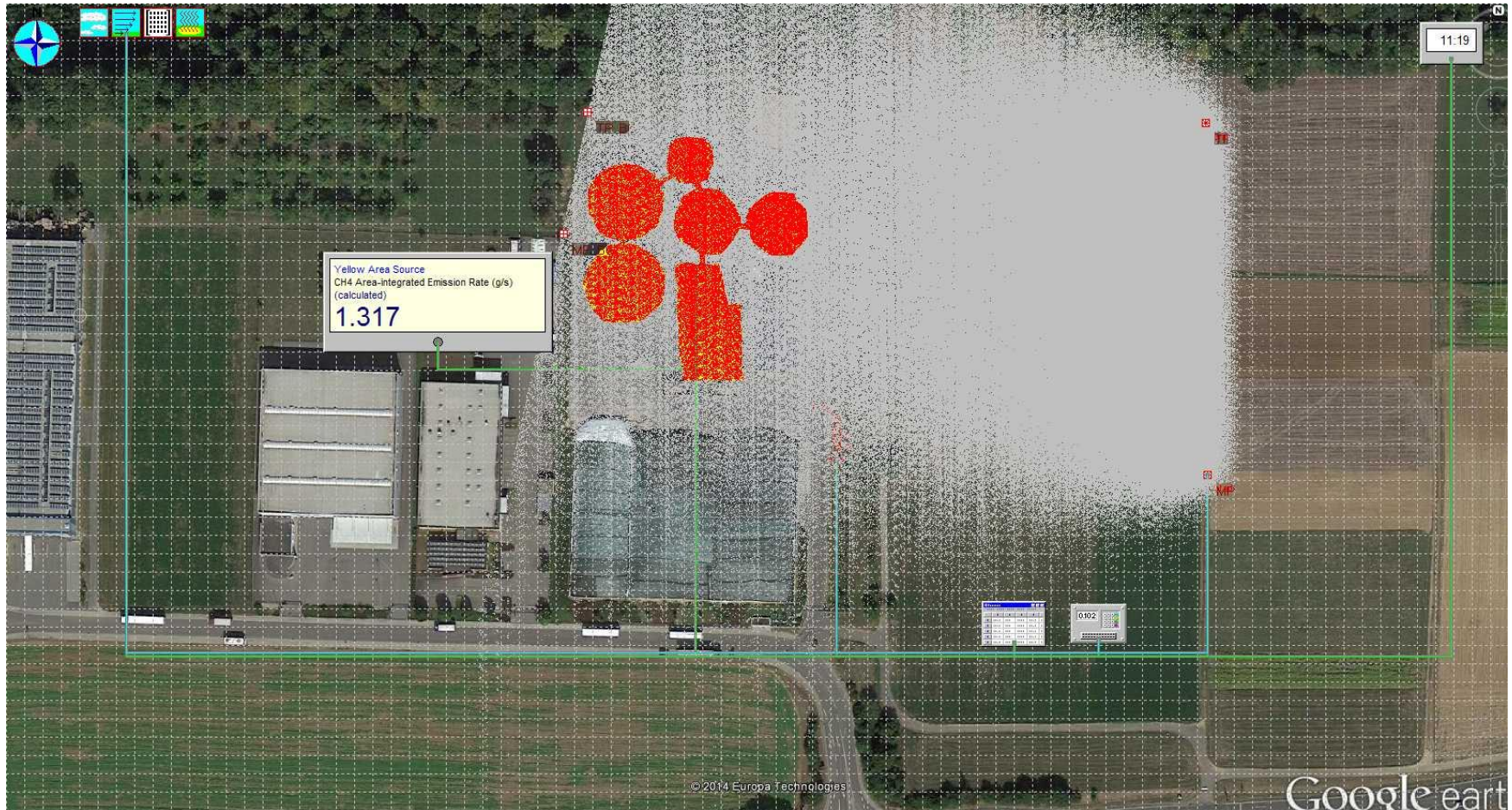


# Biogas plant

- Substrate: crops, corn and gras
- 5.0 MW (2.0 MW<sub>el</sub>)
- Biogas is refined on natural gas quality
- 56% CH<sub>4</sub> content in biogas
- 500 m<sub>N</sub><sup>3</sup>/h CH<sub>4</sub> production



# WindTrax simulation



<http://www.iswa.uni-stuttgart.de>



# Membrane roof exchange

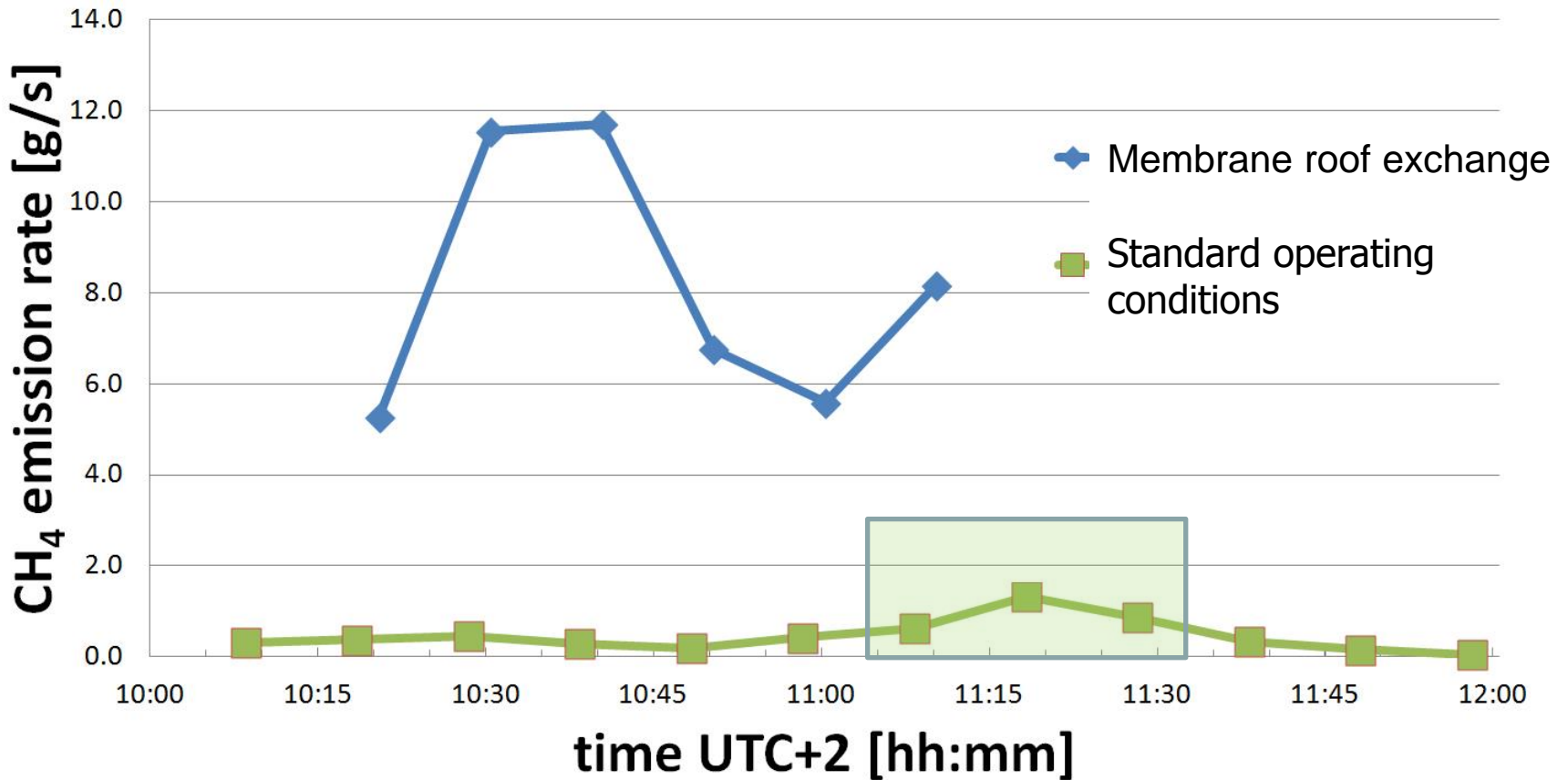


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# Result





# Summary

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- Simple and generally available method to quantify methane emissions
- Monitoring methane emission rates might help to reveal possible leakages or adverse operational management
- Knowledge of methane emission rates benefits the intention for biogas production efficiency enhancements



**Thank you for your attention!**

<http://www.iswa.uni-stuttgart.de>

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