

Zusammenfassung der Dissertation:

**model based analysis  
to improve the energy allocation  
of future offshore wind energy farms through biogas technology**

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Since the beginning of industrial revolution energy supply in Germany was based on fossil fuels. Climatic change, the greenhouse effect, the growth of population on the one hand and shortage on fossil fuels on the other hand and the will to be independent from importing resources from political instable countries are calling for serious changes. The primary modernisation of the current energy supply needs to target a sustainable, generation comprehensive solution. The use of renewable fuels is necessary.

Wind energy usage is one of the most promising alternatives within the short-term to middle-term planning of environmental policy. As in Germany nearly all potential habitats on mainland already are tapped, significant development potential is seen at offshore habitats in North as well as Baltic Sea. Germany aims for the allotment of up to 25 GW of offshore wind energy in the North and Baltic Sea till 2025.

Electricity generation by wind energy plants subjects to the conditions the volatile characteristics of the wind. Within the planned big offshore wind energy farms comprising more than 80 plants changes in wind velocity as well as directions will lead to fluctuations in energy supply.

Up to now the plant resource scheduling needed to react on the users demand. The further development of wind energy and the differences between forecasted and actual wind energy feeds do and will hinder this resource scheduling. New approaches need to be found to be able to ensure the security of energy supplies in Germany. These approaches should be sustainable and therefore be based on the usage of renewable fuels.

Within this dissertation possible solutions as well as constraints of the usage of biogas as a nearly CO<sub>2</sub> neutral fuel in combination with micro gas turbines adapted to the usage with biogas plants to be able to align the differences between forecasted and actual wind energy supply for a future offshore wind energy plant park are analysed. This combination allows an energy supply that on the one hand is independent from fossil fuels and on the other hand could be easily adjusted to current demands.