Lucerne University of
Applied Sciences and Arts

HOCHSCHULE
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Technik & Architektur

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Bachelor's thesis in Energy Systems Engineering

Design and sourcing strategy of a PV-system for water well

Design and sourcing strategy of PV-system for water well in Mongolia

The purpose of this thesis was to design a PV system and connection to a submersible water pump for a water well so that the required power can be provided. This included evaluating possible storage and back-up options, considering the environmental conditions of the location.

Using the energy system assessment methodology, the current situation was analysed, alternative solution concepts were developed, and the assessment criteria were chosen. The alternative solution concepts were assessed with a lifecycle cost analysis and a hazard analysis based on the assessment criteria. Then the results were used in a multi-criteria decision analysis that revealed the best alternative.

The developed solution was a 5.28-kW photovoltaic system with a 4-kW submersible water pump and a 5-kW power gasoline generator as a back-up option. After selecting the most suitable system to operate the pump reliably, an evaluation of possible sourcing strategies according to local possibilities was made. According to the results, the system should be sourced in Germany and then transported to Mongolia.

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Semester:
HS20

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