INTEGRATION OF HYDROGEN STORAGE INTO A SOLAR-BASED ENERGY SYSTEM FOR A REMOTE TELESCOPE IN THE ATACAMA DESERT

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ABSTRACT

In the planning of the new telescope AtLAST in the Atacama desert, greenhouse gas emissions shall be reduced by deploying a renewable energy system [1] based on solar energy. To ensure the operation of the observatory in hours with little to none renewable power generation, a robust energy storage system is essential. Such a system needs to be charged and discharged daily to ensure nighttime telescope operations, compensate for solar generation outages on cloudy days, and react to spikes in demand when the heavy motors move the 50 m single-dish telescope. The remote location and the altitude of more than 2500 m add further difficulty.

A hybrid energy storage system including batteries and hydrogen storage is proposed in order to meet the demand of the telescope. Actual data and simulations will be used to study the required performances, sizing and configuration of the various system´s components. The study of the optimal hydrogen storage solution will include the option of using metal hydrides, such as TiFe-based compounds.

This work offers the possibility to apply the material scientific knowledge on solid-state hydrogen storage materials within a large-scale project. This allows for new insights into the applicability of metal hydrides in a real-life energy system on both a technical as well as an economical level.

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REFERENCES

[1] P. Klaassen *et al.*, "The Atacama large aperture submillimeter telescope (AtLAST) concept," vol. 44, no. 0, p. 290, 2020, doi: 10.1117/12.2561315.

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Isabelle is a PhD candidate at the University of Oslo. She works in the project AtLAST (Towards an Atacama Large Aperture Submillimeter Telescope), which is dedicated to design a renewable energy system with different storage components alongside a new telescope in Chile.
Isabelle has a background in sustainability sciences and renewable energy. She is particularly interested in innovative hybrid energy storage systems that include components such as solid-state hydrogen and batteries.