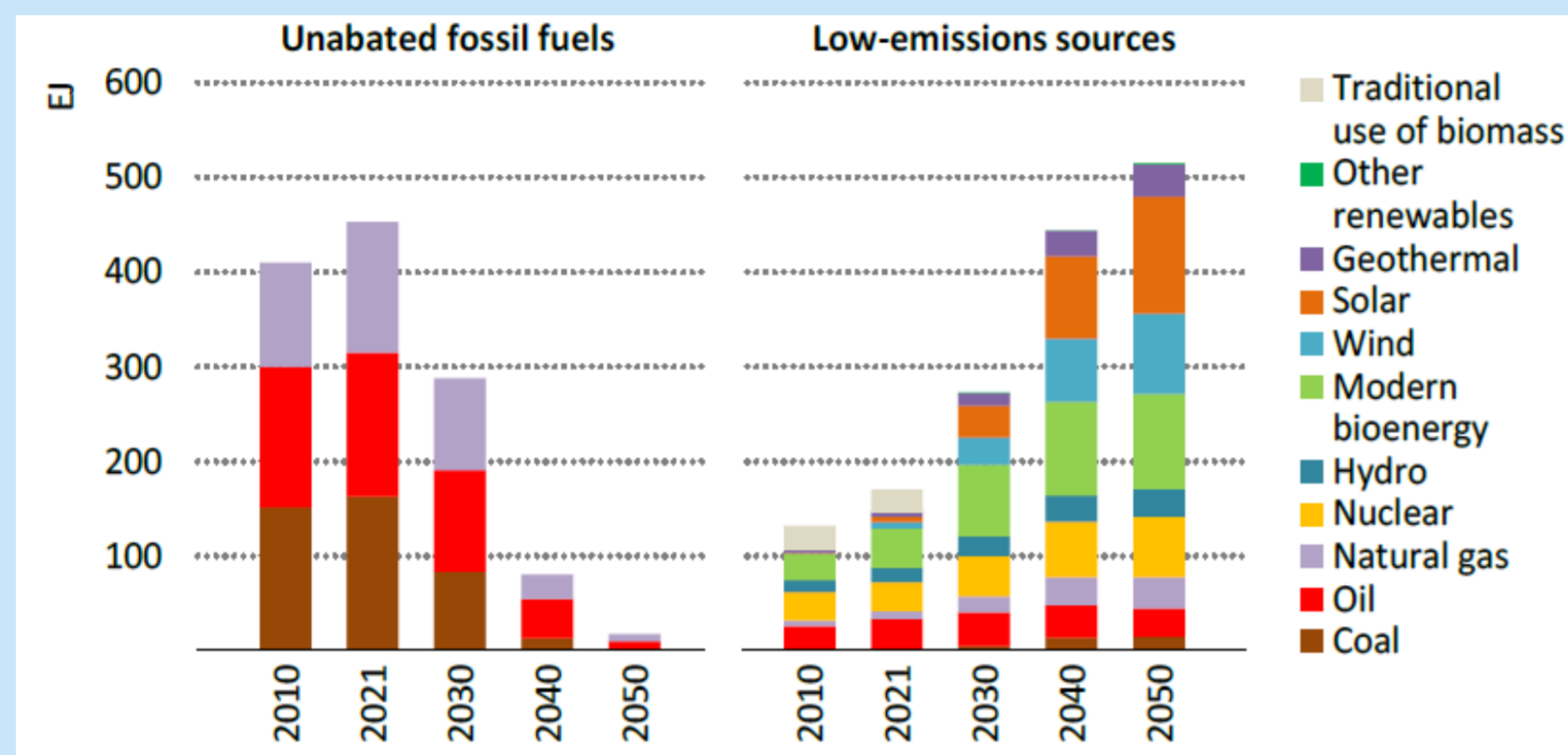


# Solar Energy Potential in Oman

## Introduction

- ❖ Energy consumption in the Sultanate of Oman is projected to grow by 7% each year.
- ❖ Oman's total electricity production reaches 5365 gigawatt-hours in 2024.
- ❖ Oman plans to achieve 30% renewable energy sources by 2030 and 39% by 2040.
- ❖ Solar energy technology has rapidly improved in recent decades, and the global installation of photovoltaic systems has been increasing at a rate of 24% annually.
- ❖ Solar PV is projected to be the largest green energy source by 2027.



Global energy supplies 2010-2050 (World energy outlook 2022)

## Problem Statements

- ✓ The efficiency of solar PV is low as opposed to conventional fuels.
- ✓ Sand dust accumulation on solar photovoltaic panels in the desert can be seriously detrimental.
- ✓ Intermittency.
- ✓ Space required and high initial cost.

## Objectives

➤ This study focuses on improving the efficiency of PV cells, mainly by investigating the key factors that influence their performance. It further investigates the production of both heat and electricity from solar panels. It develops a maintenance prediction and protocol against sand dust accumulation to ensure maximum power output.

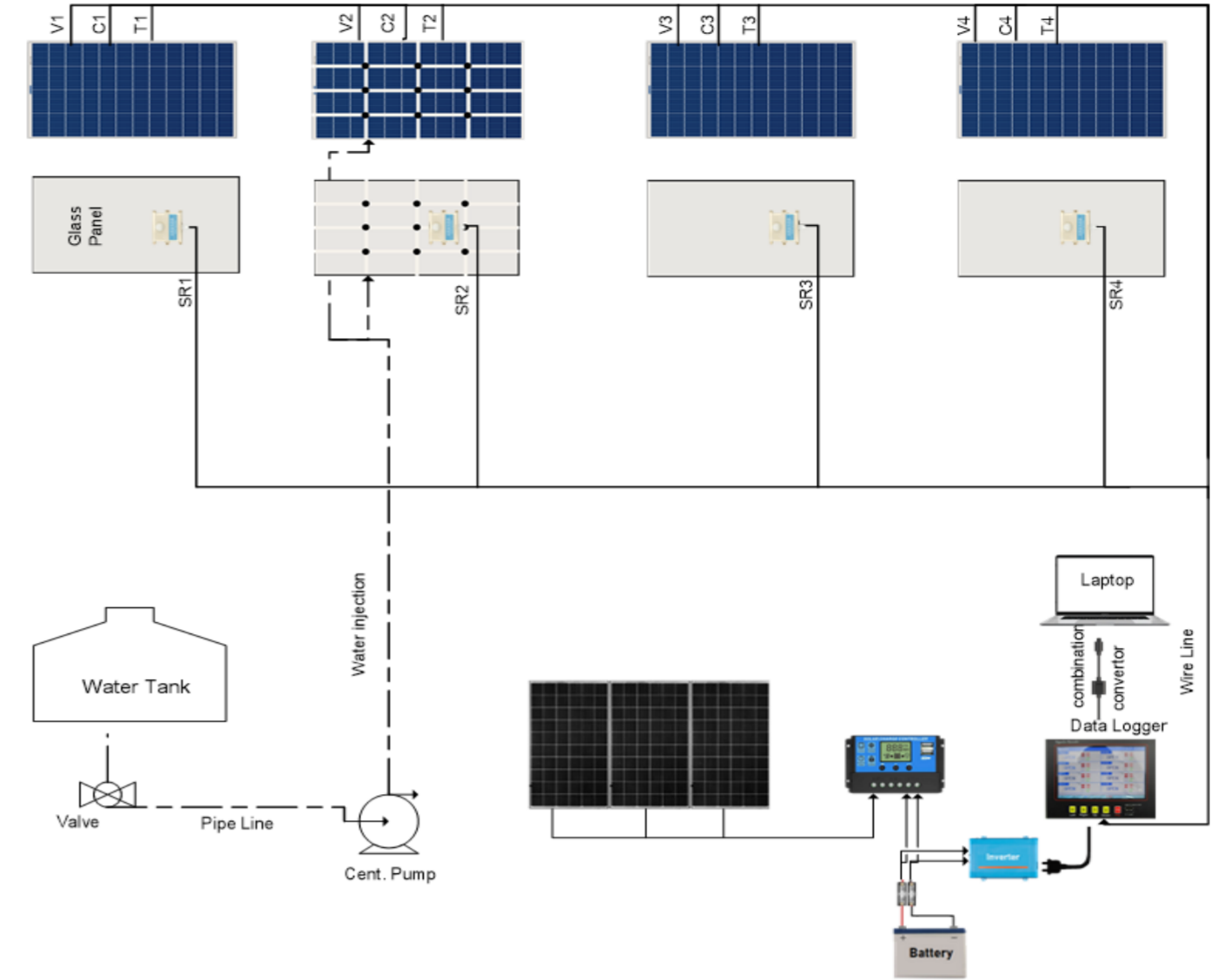
## Methodology



Experimental Setup

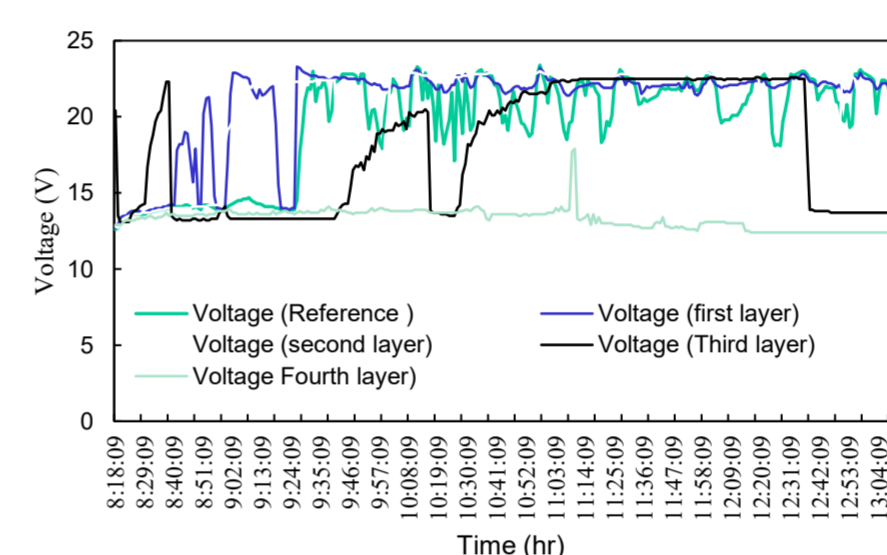


Data Acquisition Systems

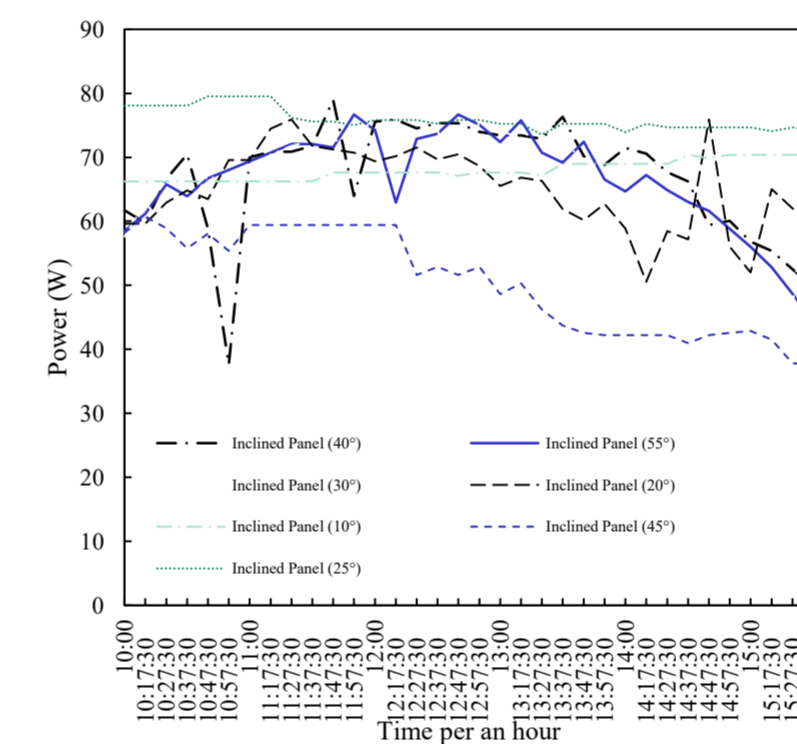


Experimental set-up (Schematic diagram)

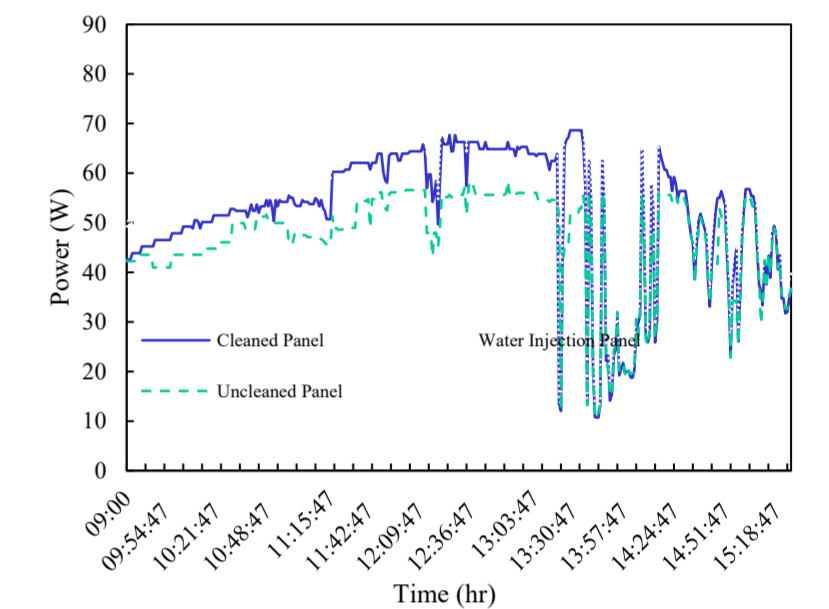
## Results and Discussion



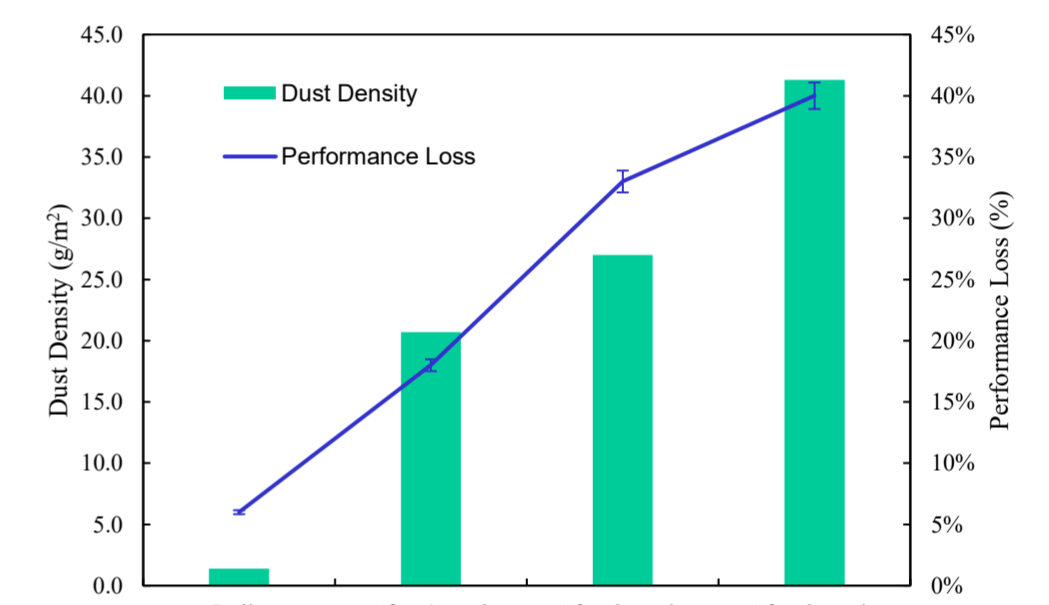
Voltages profiles (nanocoating)



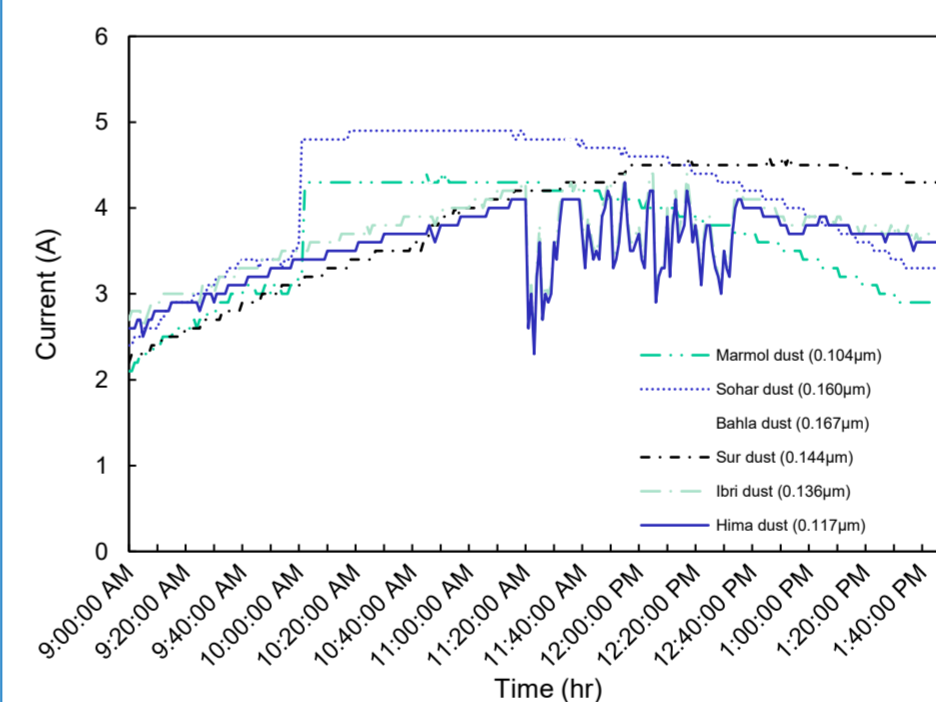
Power (Optimal tilt angle)



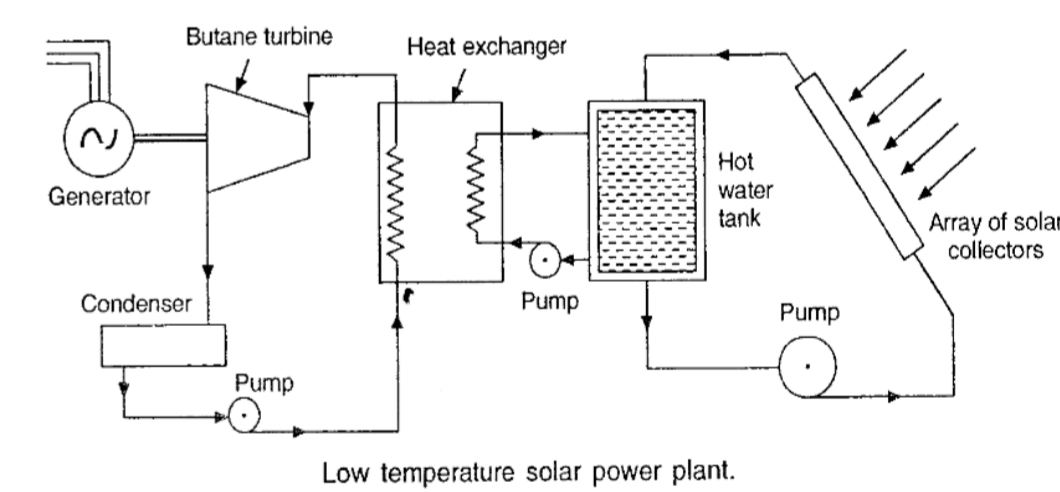
Cooling effects



Power reduction

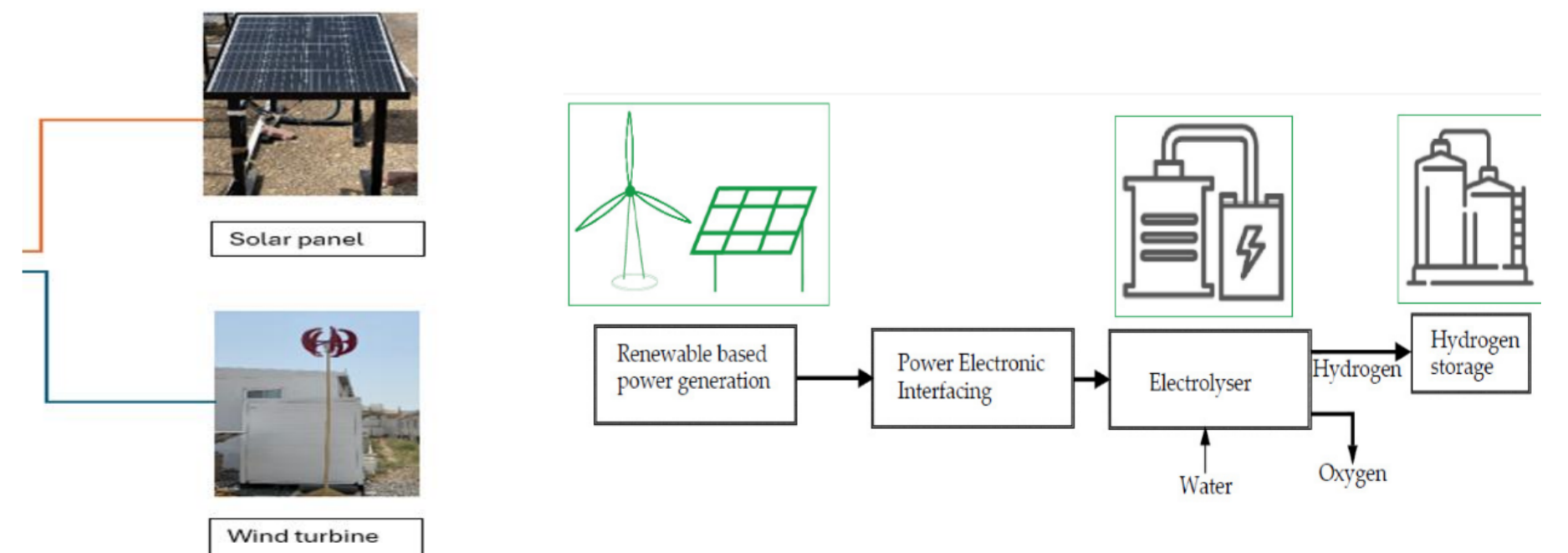


Dust types



Low temperature solar power plant.

Solar power plant from PVT



Solar hybrid and clean fuel energy production

## References (Research outputs)

1. Girma T. Chala, Sulaiman, S.A. and Al Alshaikh, S.M., 2024. Effects of Climatic Conditions of Al Seeb in Oman on the Performance of Solar Photovoltaic Panels. Heliyon, pp.1-14.
2. Girma T. Chala, Al Alshaikh, S.M. and Sulaiman, S.A. Comparative Study Between Clean, Dusty, and Muddy Photovoltaic Panels in Al Seeb, Oman. In International Conference on Environmental Science and Technology, Published in Springer Nature Switzerland, May 2024 (pp. 277-287).
3. Girma T. Chala, Sulaiman, S.A. and Al Alshaikh, S.M., 2024. Effects of cooling and interval cleaning on the performance of soiled photovoltaic panels in Muscat, Oman. Results in Engineering, p.101933.
4. Girma T. Chala and Al Alshaikh, S.M., 2023. Solar Photovoltaic Energy as a Promising Enhanced Share of Clean Energy Sources in the Future—A Comprehensive Review. Energies, 16(24), p.7919.