GENDERED DESIGN IN STEAM

Moka, Mauritius

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"One of the things I am still learning is that a prototype doesn't have to be physical."

— *Khalil Elahee*

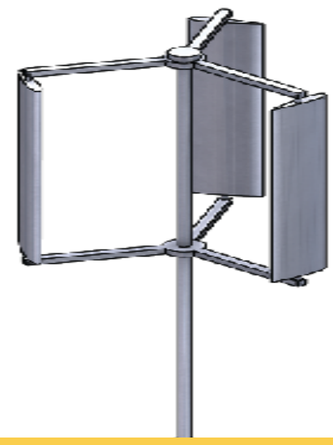
ID71 Developing small wind turbines with local women for domestic use in Mauritius

TECHNOLOGY

ENGINEERING

RENEWABLE ENERGY

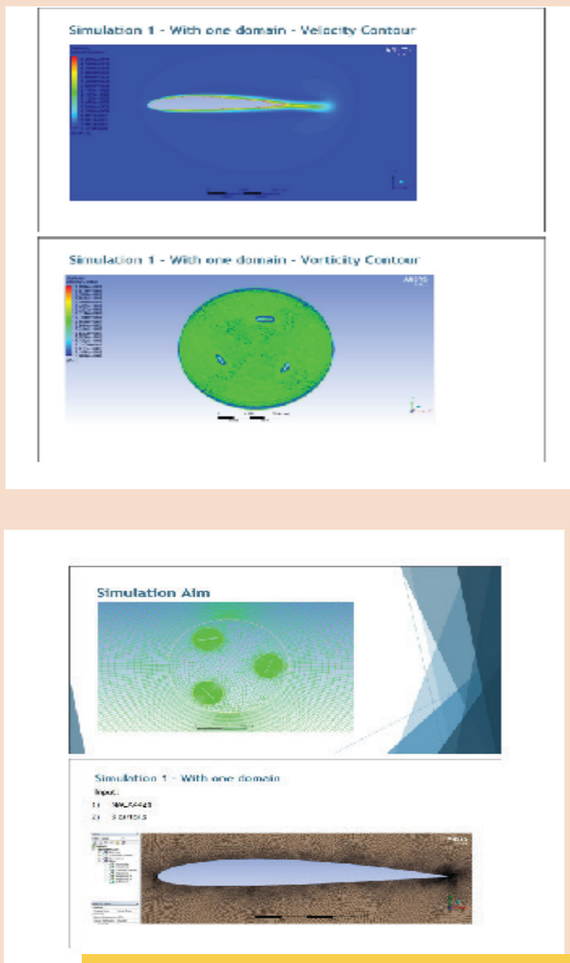
The energy transition to renewable sources, along with energy efficiency and management, are areas where women should be engaged actively. This research project aims to design and develop a prototype in the form of a computational model for a system using a vertical-axis wind turbine which can later be scaled-up for domestic use in Mauritius and other small islands. The key research question is to determine how the integration of Gendered Design in the context of small-island economies, with the case of Mauritius in particular, can be achieved using numerical simulations and optimization techniques for the latter application. As such, the efficiency and performance of a small-scale Savonius vertical-axis wind turbine under various wind speeds typical of the Mauritian environment has been numerically investigated.



A Vertical Axis Wind Turbine

Outcomes

- The project has been listed in the Mapping of Research and Innovation with Sustainable Development Goals(SDGs) for our University.
- The topic of Gendered Design has now been integrated in the syllabus (just like environmental, sustainability or safety considerations adopting a conversation approach with learners around the consideration given to gender. Not just through aesthetics or ergonomics, but as an integral part of the design concept definition process.
- Gender consideration in renewable energy recommendations made towards achieving 60% renewable energy in power generation by 2030 was included within a Position Paper from the Faculty of Engineering, proposed by a team including the Principal Investigator.



Top to Bottom: Numerical Simulation using SolidWorks/Ansys Fluent

Methods

- A two-level survey was conducted to understand gender-based energy behaviours. The Level 1 survey was comparatively more general and was performed across the Republic, including the island of Rodrigues. The Level 2 survey, on the other hand, was relatively more detailed and particularly focused on regions where a low response rate was recorded from the Level 1 survey. The need for a bottom-up approach engaging the population, in particular households' women, was largely satisfied by the conduct of these elaborate surveys in a two-tier approach.
- Computational modelling was used to design and assess the performance of a Savonius vertical-axis wind turbine under various wind speeds typical of the Mauritian environment.
- The numerical investigation of airflow across wind turbine blades is performed in a commercial CFD solver, Ansys Fluent 20.2. This software was purchased under the Royal Society DFID Africa Capacity Building Initiative, along with servers and workstations, for a project now completed successfully by the Sustainable Energy Pole of Research Excellence of the University of Mauritius under the leadership of the Principal Investigator.

Lessons & Future Directions

- Putting less faith in the effectiveness of numerical approaches is something that could have been done differently. Although incredibly effective in many applications, the limitations of such procedures are well understood since we deal with people and uncertainty so frequently in real life. Gender is important in design, although it may not always be based on computational methodologies.

Learn more

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