

# Scrap-Savonius – Small Scale VAWT for rural Tanzania

*A. Marlow, N.W.Svendsen, and J.A. Skovgaard*

DTU Management Engineering, Technical University of Denmark

## INTRODUCTION

Our concept is a windmill built out of recycled scrap metal and auto parts, which can provide free electricity for people living under difficult circumstances and replace traditional biomass sources like firewood and charcoal that accounts for largely the majority, as a source of energy in East Africa.

## A SOLUTION

85+ % of the population in Tanzania lives in the countryside away from the cities, thus also disclosed from the electricity grid, which is very scarcely spread out. Their main source of energy in rural areas comes from firewood and charcoal for lighting, heating and cooking, which poses a threat to the local environment. Implementing the scrap metal windmill will not only provide electricity to otherwise excluded households, but also help decrease CO<sub>2</sub> emission and the environmental degradation that's been increasing for the last decade. In a sunny region like most of the areas around equator, the use of solar cells would be obvious. But, they're tough to repair and if the wind is there, wind turbines are actually cheaper pr. kW. We've taken that fact and our observations through a monthly research trip to Tanzania, and compiled it into a concept that can address the above-mentioned scenarios and issues.

## SCRAP-SAVONIUS CONCEPT

Our concept is a small-scale wind turbine based on the savonius principle, mainly containing recycled auto parts and scrap metal – alas local components. The concept also comes with a plan in collaboration with local partners, to educate locals to maintain it, which makes it revolutionary in implementing technology in less developed regions.

A VAWT compared to a HAWT has several advantages that makes it suitable for Tanzania.

- Low cut-in speed
- Simple structure
- Based on standard mechanical principles
- Electronics are based at the foot
- Easy to de-assemble and reuse parts
- Due to low-tech principles, many regular mechanics can repair it with little to none supervision

The only downside is that it generally generates less power than a HAWT, which our research showed doesn't matter since it'll still generate enough power for basic needs like light and cell phone charging. Due to the benefits of the Savonius principle, we can take advantage of the presence of adequate mechanical skills and large amounts of recycled materials. Hence making it cheap, easy to repair and therefore suitable for rural Tanzania. We call it the Scrap-Savonius concept, and when fully evolved, has the potential to not only heighten the standards of living for many people around the globe, but it will also be expanding knowledge about technology, and create work flow, in regions with typically low economical flow.