

# Comparing wind energy LCOE estimation approaches

Dr. Stefan Bofinger<sup>1</sup>, Mr. Johan Nico Stander<sup>2</sup>

<sup>1</sup>Fraunhofer - IWES, Kassel, Germany, <sup>2</sup>CSIR - Energy Centre, Stellenbosch, South Africa

## Motivation

Wind power development is mainly driven by its low levelised cost of energy (LCOE). This cost of energy is estimated using two different wind resource data sources, i.e. top-down (meso-model) or bottom-up (micro-model) approaches. The simplifications applied to data, models, and correlations in LCOE calculation are studied and compared.

## Problem Statement

Are there any discrepancies when comparing LCOE estimations derived from meso-model and micro-model data sources. How does such differ when normal and complex sites are considered?

## Methodology

With the availability of verified meso-scale and micro-scale wind data; the study conducted followed these steps:

- screening available meso-scale and measured data for common normal and complex sites
- once sites were selected, topology and orographic data were sourced, classed and applied as per model requirements
- five wind turbine models of which each wind turbine include different hub heights and rotor diameters were selected
- wind farm layout constraints were defined
- wind turbine configuration and siting within wind farm were optimised on available resource only
- LCOE estimations for wind farms in normal and in complex sites were estimated and compared

## Results

The anticipate results; micro-siting based LCOE estimation closer to meso-model based estimation when considering a normal site. This is perhaps not the case the complex site.