



CONTACT INFORMATION

Name	Rolf-Erik Keck
Mobile	+46 703314441
E-mail	rolf-erik.keck@modernenergy.se

WORK HISTORY

- 2017-date:** Owner, Karlstad Modern Energy AB
- 2014-date:** Senior Wind Resource Analyst, Statkraft AS
- 2013-2013:** Post-doctoral researcher University of Oslo
- 2009-2012:** Industrial PhD student Vestas R&D and Risø DTU
- 2007-2009:** Vestas graduate R&D specialist and management program

ACADEMIC POSITIONS

- 2009-2012:** PhD in wind farm aerodynamics and loads, Risø-DTU
- 2005-2007:** MSc in energy & environmental engineering, University of Karlstad.
- 2004-2005:** First year of MSc of mechanical engineering, Chalmers university of technology.

RESEARCH, TRAINING, EXPERIENCE

2016 -2017, R&D project aimed at reducing ice-loss due to smarter turbine control strategy based on a combination of weather forecasts and cloud measurements using a ceilometer.

2017, developed simulation tool for estimation of turbine ice-losses and de-icing efficiency based on simulated temperature and moisture data.

2015-2017, main responsible for all wind and site activities at the Fosen 1000MW Midt-Norge project (<http://www.statkraft.com/about-statkraft/Projects/norway/fosen/>). This includes analysis of wind measurements, wind resource and yield calculations, site suitability and load calculations, layout optimization, noise and shadow flicker analyses as well as ice-loss calculations.

2016, served as Statkrafts' technical wind and site expert in sales process of shares in the Fosen 1000MW Midt-Norge project.

2015, served as Statkraft's technical wind and site expert in the turbine tender process for the Fosen 1000MW Midt-Norge project & involved in turbine selection.

2015-2016, wrote Statkraft's Internal guidelines for conducting loss & uncertainty of wind farm yield, noise and shadow calculations as well as WindSim CFD calculations.

2015, conducted technical calculations and served as a wind turbine wake expert in a collaborative effort with Statnett to develop guidelines for minimum spacing requirements between wind turbines and power lines.

2013, implemented the DWM (dynamic wake meandering) model in a framework for transient wake calculations. Test and validation was conducted on Smøla wind farm.

2012, re-developed the DWM model to be used as a standalone model for load screening and power production calculations.

2009 -2012, undertook 3 years of PhD research targeted at further developing the DWM model to maturity level suitable for the wind industry and the IEC standard. Four areas were identified as high prioritizations for further research:

1. the turbulence distribution in a single wake
2. multiple wake deficits and build-up of turbulence over a row of turbines
3. the effect of the atmospheric boundary layer on wake turbulence and wake deficit evolution
4. atmospheric stability effects on wake deficit evolution and meandering

2009, awarded funding for an industrial PhD from Danish innovationsfonden (<http://innovationsfonden.dk/en/investment/industrial-researcher>)

2009, developed and Implemented rotating actuator line model in Ansys CFX based on volume force representation. This allowed for stationary mesh by altering the location of the source terms periodically.

2008, further developed and implemented actuator disc model in Ansys CFX which was used to study interference by the rotor on the nacelle anemometry.

2007, developed and implemented a Matlab tool for calculating turbine power performance which became the standard tool to use at Vestas power performance group in Århus.

EDUCATION

2015: WindPRO LoadResponse. 3 days course. EMD, Aalborg Denmark.

2015: WindSim advanced course. 2 days course. Statkraft.

2014: WindPRO advanced course. 2 days course. EMD, Aalborg Denmark.

2014: WindPRO basic course. 3 days course. EMD, Aalborg Denmark.

2014: WindSim advanced course. 2 days course. WindSim, Tønsberg Norway.

2014: WindSim basic course. 2 days course. WindSim, Tønsberg Norway.

2009-2012: PhD in wind farm aerodynamics and loads, Risø-DTU

2011: OpenFOAM, PhD course. Chalmers University of Technology, Göteborg Sweden.

2010: Turbulence flow (7.5sects), PhD course. Chalmers University of Technology, Göteborg Sweden.

2010: Turbulence modelling (7.5sects), PhD course. Chalmers University of Technology, Göteborg Sweden.

2010: PhD business course (7.5sects) given by innovationsfonden, Copenhagen, Denmark.

2010: WAsP engineering. 3days, Risø Denmark.

2009: ICEM CFD meshing. 3days, Singapore.

2008: Six sigma green belt training, Århus Denmark.

2005-2007: MSc in energy & environmental engineering, University of Karlstad.

2004-2005: First year of MSc of mechanical engineering, Chalmers university of technology.

PROFESSIONAL QUALIFICATIONS

- Wind turbine aerodynamics
- Wind farm aerodynamics
- Turbulence theory & modelling
- Wake modelling
- CFD flow modelling
- Site suitability
- Wind farm energy yield estimation
- Turbine power performance
- Turbine tender processes
- Met mast data analyses
- Numerical modelling
- Statistics

COMPUTER SKILLS

- Microsoft Office
- Matlab
- Comsol mutiphysics
- Ansys ICEM
- Ansys CFX
- Xfoil
- WindSim
- WindPRO
- ANSYS WindModeller
- FUGA

PUBLICATIONS (as main author)

2015:

- A pragmatic approach to wind farm simulations using the dynamic wake meandering model. Wind Energy (WE.1783)
- Validation of the standalone implementation of the dynamic wake meandering model for power production. Wind Energy (WE.1777)
- Two Improvements to the Dynamic Wake Meandering Model: Including the Effects of Atmospheric Shear on Wake Turbulence and Incorporating Turbulence Build Up in a Row of Wind Turbines. Wind Energy (WE.1686)

2014:

- Synthetic atmospheric turbulence and wind shear in large eddy simulations of wind turbine wakes. Wind Energy (WE.1631)
- On Atmospheric Stability in the Dynamic Wake Meandering Model. Wind Energy (WE.1662)

2013:

- PhD thesis: A consistent turbulence formulation for the dynamic wake meandering model in the atmospheric boundary layer. Available at: <http://orbit.dtu.dk/en/publications/a-consistent->

[turbulence-formulation-for-the-dynamic-wake-meandering-model-in-the-atmospheric-boundary-layer\(0222ac75-fd0b-42e0-9345-aa3dc493bd71\).html](https://doi.org/10.1016/j.solar.2012.02.001)

2012:

- Implementation of a Mixing Length Turbulence Formulation Into the Dynamic Wake Meandering Model, Journal of Solar Energy Engineering.
- A numerical investigation of nacelle anemometry for a HAWT using actuator disc and line models in CFX, Renewable Energy.