Energy Expertise
// Wind Energy

Main expertise areas

- Wind turbine condition monitoring and reliability assessments (**Prof Simon Hogg, Dr Behzad Kazemtabrizi, Dr Christopher Crabtree, Dr Mahmoud Shahbazi**)
- Data Mining Wind Farm Operational and Maintenance Data (**Dr Pete Matthews**)
- Wind farm operation and maintenance optimisation (**Dr Peter Matthews, Dr Christopher Crabtree, Dr Behzad Kazemtabrizi**)
- Quantification of uncertainty in offshore wind transmission systems asset management (**Dr Behzad Kazemtabrizi, Dr Matthias Troffaes**)
- Evaluating the impact and interaction of large-scale variable wind generation to the electric power grid (**Dr Behzad Kazemtabri**zi)
- Design, Test and Build of Prototype Turbine Geometries (**Dr Grant Ingram**)
- Aerodynamics of Vertical Axis Wind Turbines (**Dr Grant Ingram**)
- Sub-sea foundations (**Prof Charles Augarde & Dr Will Coombs**)
- Seabed ploughing for cable installation (**Prof Charles Augarde & Dr Will Coombs**)
- Failure of Power Electronic Components in Wind Turbines (**Dr Christopher Crabtree, Dr Mahmoud Shahbazi**)
- Self-repairing electrical systems applied to Wind turbines (**Prof Alan Purvis**)
- Modelling the flow over terrain for Accurate Thermal Ratings of Cables (**Dr Grant Ingram**)
- Imaging, visualisation and analysis   blade and installation defect detection using unmanned aerial vehicle (**Dr Toby Breckon**)
- Experimental Measurements of Loss Mechanisms in Turbines (**Dr Grant Ingram**)
- Design, development and testing of Sustainable and High Energy Efficiency Electrical Machines (**Dr Chris Spargo**)
- Fault-tolerant power electronic converters for wind energy systems **(Dr Mahmoud Shahbazi)**
- Perceptions and attitudes towards wind power in local communities (**Prof Sandra Bell & Dr Simone Abram**)
- Community energy schemes and wind energy (**Prof Sandra Bell**)
- Supply chain management of offshore wind energy **(Dr Riccardo Mogre)**

Background

Durham University research into wind energy focuses on the reliability and condition monitoring of wind turbines in order to raise turbine availability and reduce the overall cost of energy. This includes the analysis of resource and the measurement of performance, as well as testing the effectiveness of new designs. The UK now has more offshore wind capacity than any other country in the world and Durham University research is helping to ensure this sector is efficient and cost effective. The group also undertakes research into large onshore, and offshore, medium and domestic wind.

The greatest area of uncertainty in offshore wind lies below the water, for example cabling issues are at the route of 70% of insurance payouts. Researchers at Durham are developing numerical analysis tools to provide greater confidence in two key areas, namely: subsea ploughing for cable installation and foundation solutions in intermediate water depths. The numerical work is supported by partner universities providing both laboratory and field data.

The wind energy research group has strong research links with the Wind Energy Industry including DONG Energy which is the global leader in offshore wind power, the Offshore Renewable Energy Catapult, SMD, Cathie Associates, Lloyd's Register, Saipem and Roger Bullivant.

Recent projects

- Principal Investigator of the prestigious £2.55M UK EPSRC Supergen Wind project involving 9 universities and research institutes.
- Trainer, disseminator and reliability expert on the €5.5M EU FP7 RELIAWIND Consortium.
- Principal Investigator of the £1M UK EPSRC FRENS Energy China Call Consortium working on Drive Train and Electrical Conversion Technology.
- Principal Investigator of the £500k UK EPSRC COMPERE project with Warwick University working on the reliability of Power Converter Bridges.
- Principal investigator of the £473k UK EPSRC "Seabed ploughing" (grant ref. EP/M000397/1 and EP/M000362/1)
- Coordinated distributed control in offshore wind farms – developing wind farm control algorithms which are fast and accurate enough to control whole wind farms and using models to optimise wind farms
- Dual-axis fatigue testing of large wind turbine blades.

Facilities

- Extensive array of wind tunnels in the School. Our largest wind tunnel features a turbulence generation system capable of producing repeatable unsteady flow events.
- Instrumentation capability for both on and off-site measurement.
- Smart Grid Laboratory hosting a low-voltage network with wind turbine emulation system and a wide range of other low carbon technologies.
- Drive train and condition monitoring test facility.

Research team

Professor Simon Hogg; Dr Christopher Crabtree; Dr Peter Matthews; Dr Grant Ingram; Dr Behzad Kazemtabrizi; Dr Donatella Zappalá; Prof Charles Augarde; Dr Will Coombs; Dr Toby Breckon; Dr Mahmoud Shahbazi, Dr Riccardo Mogre.

Postgraduate Opportunities

The following relevant masters courses are available at Durham University:
MSc in New and Renewable Energy within the Department of Engineering
MSc in Energy and Society in collaboration with the Department of Anthropology

We welcome enquiries about PhD and Masters research projects from prospective students. You can find details of Masters or PhD research projects currently on offer or being undertaken at Durham University in wind energy at
https://www.durham.ac.uk/dei/training/postgraduate.topics/wind.turbo.data/
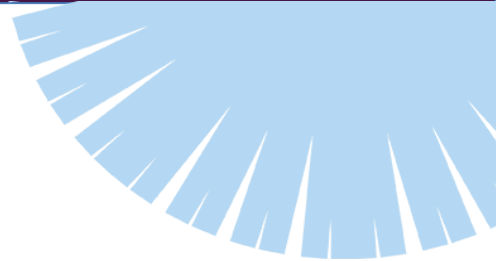
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