

# Jethro Browell

(formerly Jethro Dowell)

Curriculum Vitae

Address: Technology and Innovation Centre  
99 George Street  
Glasgow, G1 1RD, UK

Tel: +44 (0) 141 444 7297  
Mob: +44 (0) 79636 22 777  
Email: [jethro.browell@strath.ac.uk](mailto:jethro.browell@strath.ac.uk)  
Web: [www.jethrobrowell.com](http://www.jethrobrowell.com)

## Contents

<b>Positions</b>	<b>1</b>
<b>Education</b>	<b>1</b>
<b>Publications</b>	<b>2</b>
<b>Funding and Awards</b>	<b>4</b>
<b>Research Supervision and Management</b>	<b>7</b>
<b>Presentations, Seminars and Conferences</b>	<b>7</b>
<b>Research Activities</b>	<b>8</b>
<b>Teaching Activity</b>	<b>8</b>
<b>Knowledge Exchange Activity</b>	<b>9</b>
<b>Professional Membership</b>	<b>10</b>
<b>Citizenship</b>	<b>10</b>

## Positions

### University of Strathclyde, Glasgow, UK.

- 2020–** *Lecture (Chancellor’s Fellow), Dept. Electronic and Electrical Engineering*
- EPSRC-UKRI Innovation Fellow, 2018–2021.
  - Research in mathematical modelling for energy systems, primarily energy forecasting and associated decision-making.
  - Principal and Co-Investigator roles on research and knowledge exchange projects, grant writing and managing research staff.
  - Teaching and supervision at BSc, MSc and PhD level, and development of on-line courses.
- 2015–2020** *Research Associate/Fellow (2017), Dept. Electronic and Electrical Engineering*

## Education

### Degrees

- 2011–2015** *University of Strathclyde, Glasgow, UK.*  
PhD: “*Spatio-temporal Prediction of Wind Fields.*”  
Supervisors: Dr Stephan Weiss and Prof David Infield.  
Structure: ‘1+3’ EPSRC Centre for Doctoral Training.  
Three months as a visiting researcher at the Technical University of Denmark.
- 2007–2011** *University of St Andrews, UK.*  
MPhys (Hons), 2:1, Mathematics and Theoretical Physics.  
Master’s Research Project: “*Magnetic Fields Containing Two Null Points and a Separator.*”  
Cedric Thorpe Davie Award for contribution to University musical life.

### Additional

- 2019** *Leading Research Programme, University of Strathclyde*  
I have completed this 3 day course delivered by *My Consultants* developing skills in research management and leadership.
- 2018–2019** *Supervisor Development Programme, University of Strathclyde*  
I have completed training courses in research supervision making me eligible to supervise PhD students at the University of Strathclyde.

**2016–2017** *PGCert: Academic Practice, University of Strathclyde*

I have completed courses in Teaching and Learning, Knowledge Exchange and Researcher Development which comprise a PGCert accredited by the higher education academy. Delivered by the University of Strathclyde’s Organisational and Staff Development Unit.

## Publications

**Metrics**     [Google Scholar](#): Citations 428, h-index: 8  
[Scopus](#): Citations (excluding self-cite): 236, h-index: 6  
[jethrobrowell.com](#): >600 unique visitors per-month

**In prep**     List of working papers available at [www.jethrobrowell.com](http://www.jethrobrowell.com).

- Journal**
1. R. Tawn, **J. Browell**, and I.A. Dinwoodie, “Missing Data in Wind Farm Time Series: Properties and Effect on Forecasts,” *Electric Power Systems Research (PSCC 2020 Special Issue)*, vol. 189, December 2020, 106640, DOI: [10.1016/j.epsr.2020.106640](https://doi.org/10.1016/j.epsr.2020.106640), 2020.
  2. C. Gilbert, **J. Browell** and D. McMillan, “Probabilistic Access Forecasting for Improved Off-shore Operations,” *International Journal of Forecasting*, DOI: [10.1016/j.ijforecast.2020.03.007](https://doi.org/10.1016/j.ijforecast.2020.03.007), 2020.
  3. J.W. Messner, P. Pinson, **J. Browell**, M.B. Bjerregard and I. Schicker “Evaluation of Wind Power Forecasts — An up-to-date view,” *Wind Energy*, 23:1461–1481, DOI: [10.1002/we.2497](https://doi.org/10.1002/we.2497), 2020.
  4. M. Nedd, **J. Browell**, K. Bell and C. Booth, “Containing Loss Risk in a Low Inertia GB Power System,” *IEEE Transactions on Industry Applications*, vol. 6, no. 2, 1031–1039, DOI: [10.1109/TIA.2019.2959996](https://doi.org/10.1109/TIA.2019.2959996), 2020.
  5. C. Sweeney, R.J. Bessa, **J. Browell**, P. Pinson, “The Future of Forecasting for Renewable Energy,” *WIREs Energy and Environment*, vol. 9, no. 2, DOI: [10.1002/wene.365](https://doi.org/10.1002/wene.365), 2020.
  6. C. Gilbert, **J. Browell** and D. McMillan, “Leveraging Turbine-level Data for Improved Probabilistic Wind Power Forecasting,” *IEEE Transactions on Sustainable Energy*, vol. 11, no. 3, pp. 1152–1160, DOI: [10.1109/TSTE.2019.2920085](https://doi.org/10.1109/TSTE.2019.2920085), 2020.
  7. C. Edmunds, S.M. Martinez, **J. Browell**, E. Gómez-Lázaro, S. Galloway, “The evolution of wind power participation in reserve and response markets in Great Britain and Spain,” *Renewable and Sustainable Energy Reviews*, vol. 115, DOI: [10.1016/j.rser.2019.109360](https://doi.org/10.1016/j.rser.2019.109360), 2019.
  8. **J. Browell**, D. R. Drew and K. Philippopoulos, “Improved Very-short-term Spatio-temporal Wind Forecasting using Atmospheric Regimes,” *Wind Energy*, 21(11), 968–979, DOI: [10.1002/we.2207](https://doi.org/10.1002/we.2207), 2018.
  9. **J. Browell**, “Risk Constrained Trading Strategies for Stochastic Generation with a Single-Price Balancing Market,” *Energies*, 11(6):1345, DOI: [10.3390/en11061345](https://doi.org/10.3390/en11061345), 2018.
  10. R. J. Bessa, C. Möhrle, V. Fundel, M. Siefert, **J. Browell**, S. H. El Gaidi, B-M. S. Hodge, U. Cali, “Towards Improved Understanding of the Applicability of Uncertainty Forecasts in Wind Energy,” *Energies*, 10(9):1402, DOI: [10.3390/en10091402](https://doi.org/10.3390/en10091402). 2017.
  11. A. Malvaldi, S. Weiss, D. Infield, **J. Browell**, P. Leahy, A. Foley, “A spatial and temporal correlation analysis of aggregate wind power in an ideally interconnected Europe,” *Wind Energy*, 20(8), 1315–1329, DOI: [10.1002/we.2095](https://doi.org/10.1002/we.2095), 2017.
  12. L. Cavalcante, R. J. Bessa, M. Reis and **J. Browell**, “Sparse Structures for Very Short-term Wind Power Forecasting,” *Wind Energy*, 20(4), 657–675, DOI: [10.1002/we.2029](https://doi.org/10.1002/we.2029), 2017.
  13. **J. Dowell**, P. Pinson, “Very-short-term Probabilistic Wind Power Forecasts by Sparse Vector Autoregression,” *IEEE Transactions on Smart Grid*, 7(2), pp. 763–770, DOI: [10.1109/TSG.2015.2424078](https://doi.org/10.1109/TSG.2015.2424078), 2016.
  14. V. M. Catterson, D. McMillan, I. Dinwoodie, M. Revie, **J. Dowell**, J. Quigley, K. Wilson, “An economic impact metric for evaluating wave height forecasters for offshore wind maintenance access,” *Wind Energy*, 19(2), pp. 199–212, DOI: [10.1002/we.1826](https://doi.org/10.1002/we.1826), 2015.
  15. **J. Dowell**, S. Weiss, D. Hill, D. Infield, “Short-Term Spatio-Temporal Prediction of Wind Speed and Direction,” *Wind Energy*, 17(12), pp. 1945–1955, DOI: [10.1002/we.1682](https://doi.org/10.1002/we.1682) 2014.
- In Book**
1. R. Bessa, **J. Dowell**, P. Pinson, “Renewable Energy Forecasting,” in the *Smart Grid Handbook*, edited by C-C. Liu, S. McArthur and S-J. Lee, Chichester, UK: John Wiley & Sons Ltd, ISBN: [978-1-118-75548-8](https://doi.org/10.1002/9781118755488), 1900 pages, Chapter: 639–659, 2016.

- Other** 1. International Energy Agency — Wind: “Recommended Practices for the Implementation of Wind Power Forecasting Solutions,” Eds: C. Möhrle, J. Zack, J.W. Messner and **J. Browell**, 2019.
- Conference** 1. **J. Browell\***, C. Gilbert, R. Tawn, L. May, “Quantile combination for the EEM Wind Power Forecasting Competition”, invited paper, European Energy Market Conference, 2020.
2. **J. Browell\*** and C. Gilbert, “ProbCast: Open-source Production, Evaluation and Visualisation of Probabilistic Forecasts,” Probabilistic Methods Applied to Power Systems Conference, 2020.
3. C. Gilbert\*, **J. Browell**, D. McMillan, “A Data-Driven Vessel Motion Model for Offshore Wind Access Forecasting,” IEEE Oceans, Marseille, France, 2019.
4. C. Gilbert\*, **J. Browell**, D. McMillan, “Visualisation of Probabilistic Access Forecasts for Offshore Operations,” WindEurope, Bilabo, Spain, 2019.
5. C. Möhrle\*, J. Lerner, J.W. Messner, **J. Browell**, A. Tuohy, J. Zack, C. Collier, G. Giebel, “IEA Wind Recommended Practices for the Implementation of Wind Power Forecasting Solutions Part 2 and 3: Designing and executing forecasting benchmarks and evaluation of forecast solutions,” Wind Integration Workshop, Stockholm, Sweden, 2018.
6. C. Gilbert\*, **J. Browell** and D. McMillan, “A Hierarchical Approach to Probabilistic Wind Power Forecasting,” Probabilistic Methods Applied to Power Systems (PMAPS), Boise, Idaho, 2018.
7. **J. Browell** and C. Gilbert\*, “Cluster-based Regime-switching AR for the EEM Wind Power Forecasting Competition,” 14th International Conference on the European Energy Market (EEM), Dresden, Germany, [post-print available online](#), 2017. **Invited Paper**
8. **J. Browell\***, C. Gilbert and D. McMillan, “Use of Turbine-level Data for Improved Wind Power Forecasting”, IEEE PowerTech, Manchester, UK, [post-print available online](#), 2017.
9. **J. Dowell\***, I. Dinwoodie and D. McMillan, “Forecasting for Offshore Maintenance Scheduling under Uncertainty”, European Safety and Reliability Conference, Glasgow, UK, DOI: [10.1201/9781315374987-171](#) 2016.
10. **J. Dowell\***, G. Hawker, K. Bell and S. Gill, “Review of Probabilistic Methods of Defining Reserve Requirements,” IEEE PES General Meeting, Boston, MA, DOI: [10.1109/PESGM.2016.7741361](#), 2016.
11. A. Malvaldi\*, **J. Dowell**, S. Weiss, D. Infield, “Short-Term Forecasting of Wind Speed and Direction Exploiting Data Non-Stationarity,” International Work-Conference on Time Series, Granada, Spain, 2015
12. **J. Dowell\***, S. Weiss, D. Infield, “Kernel Methods for Short-term Spatio-temporal Wind Prediction,” IEEE PES General Meeting, Denver, CO, DOI: [10.1109/PESGM.2015.7285965](#), 2015.
13. **J. Dowell\***, S. Weiss, D. Infield, “Spatio-Temporal Prediction of Wind Speed and Direction by Continuous Directional Regime,” Probabilistic Methods Applied to Power Systems, Durham, UK, DOI: [10.1109/PMAPS.2014.6960596](#), 2014. **Outstanding Student Paper Award**
14. **J. Dowell\***, S. Weiss, D. Infield, S. Chandna, “A Widely Linear Multichannel Wiener Filter for Wind Prediction,” IEEE Statistical Signal Processing Workshop, Gold Coast, Australia, DOI: [10.1109/SSP.2014.6884567](#), 2014.
15. A. Malvaldi\*, **J. Dowell**, S. Weiss, D. Infield, D. Hill, “Wind Prediction Enhancement by Supplementing Measurements with Numerical Weather Prediction Now-Casts,” EAWE 10<sup>th</sup> PhD Seminar on Wind Energy in Europe, 2014.
16. **J. Dowell\***, S. Weiss, “Short-Term Prediction Using an Ensemble of Particle Swarm Optimised FIR Filters,” IET Conference on Intelligent Signal Processing, London, 2013.
17. **J. Dowell\***, A. Zitrou, L. Walls, T. Bedford, D. Infield, “Analysis of Wind and Wave Data to Assess Maintenance Access to Offshore Wind Farms,” European Safety and Reliability Association Conference, Amsterdam, ISBN: [9781138001237](#), 2013.
18. H. Macdonald\*, **J. Dowell**, S. Weiss, D. Infield, D. Hill, “Wind Prediction Enhancement by Environmental Parameters,” Proceedings of the 9<sup>th</sup> PhD Seminar on Wind Energy in Europe, EAWE, 2013.
19. **J. Dowell\***, S. Weiss, D. Hill, D. Infield, “A Cyclo-stationary Complex Multichannel Wiener Filter for the Prediction of Wind Speed and Direction,” European Signal and Image Processing Conference, Marrakech, E-ISSN: [2076-1465](#) 2013.
20. **J. Dowell\***, S. Weiss, D. Hill, D. Infield, “Improved Spatial Modelling of Wind Fields,” European Wind Energy Association Annual Conference, Vienna, 2013.

\* denotes presenting author

**Editorial** *Member of the Editorial Board: Renewable and Sustainable Energy Reviews (2019–present)*  
 Editorial duties for this leading journal (top decile, impact factor 10.6) responsible for reviewing wind energy and forecasting related submissions.

*Guest Editor: Renewable and Sustainable Energy Reviews (2018–2019)*

Guest editor of a special issue of RSER in marine and ocean energy dedicated to the work and memory of Professor Ian Bryden.

## Reviews

*Regular reviews for:*

IEEE Trans. Power Systems, IEEE Trans. Smart Grid, IEEE Trans. Sustainable Energy, IEEE Trans. Industrial Informatics, International Journal of Forecasting, Renewable & Sustainable Energy Reviews, Meteorological Applications (RMetS), IEEE Power Engineering Letters, Wind Energy, Power Systems Computation Conference, Energies (MPDI), European Safety and Reliability Conference, IET Renewable Power Generation, Neural Computing & Applications, WindEurope Conferences, EAWE PhD Seminar.

## Funding and Awards

NB: Projects labelled TIC-\* refer to those funded by the University of Strathclyde's Technology and Innovation Centre's industry funded Low Carbon Power and Energy Programme.

## Funding

TIC-LCPE (PI, 2020-2021, 12 month, £111k), *“Modelling Wind Power for Probabilistic Transmission System Planning”*

Development of improved methodologies and high-quality dataset for modelling wind power climatologies. For use in probabilistic planning studies by Scottish Transmission and Distribution Network Owners.

TIC-LCPE (Data-02) and EPSRC Supergen Energy Networks Flexfund (PI, 2019-2020, 13 month, £125k), *“Energy Forecasting for Market-led Multi-vector Networks (EnFORMM)”*

Development of forecasting methodology for intraday electricity and gas price forecasting. Partners include SSE, ScottishPower, University of Duisburg-Essen and the Energy Systems Catalyst. Project co-funded by the TIC Low Carbon Power and Energy programme and the EPSRC Supergen Energy Networks Hub.

TIC-Networks-06 (Co-I, 2019-2020, 9 month, £150k), *“Operating a Zero Carbon GB Power System in 2025: Frequency and Fault Current”*

Analysis of NGENSO's target of being able to operating the GB power system with zero carbon generation only by 2025 focusing on frequency response and fault current, and the potential role of SSE and SPR's generation portfolios.

EPSRC Responsive Mode (Co-I, 2019-2021, 24 months, £700k), *“Analytical Middleware for Informed Distribution Networks (AMIDiNe)”*

I lead a work package of this project focused on LV demand forecasting and analytics. AMIDiNe is lead by Strathclyde and in partnership with the University of Oxford, University College London, Drax Power, SSE Networks, Bellrock Technology and CountingLab.

TIC-Wind-09 (Co-I, 2019, 1 month, £16k), *“Met-ocean Access Sensor Location Study”*

A study of options for locating sensors within offshore wind farms to measure wave height and other variables to support access decision.

TIC-Hydro-04 (PI, 2019, 8 months, £80k), *“Sub-seasonal-to-seasonal Hydro Resource Forecasting”*

I developed and lead this project, supported by a Co-I team in the Dept. of Civil and Environmental Engineering and an RA, which will evaluate and advance forecasting methodologies for extended-range hydro power stations in Scotland utilising state-of-the-art S2S weather forecasts and statistical post-processing techniques.

OpenLV IAA (Co-I, 2019, 6 months, £12k), *“OpenLV: Low Voltage Demand Forecasting and Phase Balancing”*

Working with the Network Innovation Competition project *OpenLV* I am part of a team developing software for substation control systems to perform low voltage load forecasting and phase balancing using flexible resources. Funded by the University of Strathclyde's EPSRC Impact Accelerator Account (IAA)

EPSRC-UKRI Innovation Fellowship (PI & Fellow, 2018–2021, £310k), “*System-wide Probabilistic Energy Forecasting.*”

Bold and ambitious project to develop methods for national-scale probabilistic energy forecasting capturing spatial and temporal covariance between large-scale and embedded renewable energy resources and electricity demand, and dependency on large-scale meteorological phenomena.

EPSRC Supergen Wind Flexible Funding Special Projects Call (Co-I, 2018, £30k), “*Automated Video Analysis for Accurate Wave Height Measurements in Offshore Wind Farms.*”

Development of automate video processing to derive wave height and other oceanographic variables from CCTV at offshore wind farms for improved access assessment and forecasting.

TIC-Hydro-01 (PI, 2017–2018, 6 months, £40k), “*Short to Medium Term Hydro Resource Forecasting*”

I developed and now lead this project, supported by a Co-I team in the Dept. of Civil and Environmental Engineering and an RA, which will 1) evaluate and advance forecasting methodologies for hydro power stations operated by ScottishPower and SSE in Scotland, and 2) perform a high-level economic assessment of improved hydro resource forecasts. This is a ‘proof of concept’ project being undertaken to prime future growth in this area.

Energy Technology Partnership (PI, 2017–2018, 5 months, £20k), “*Dynamic Load Grid Modelling*”

I led this knowledge exchange project to bring state-of-the-art electricity load forecasting closer to commercialisation working with software vendor Datalytics Technologies, managing one RA.

The DataLab Industrial PhD Studentship, with Natural Power (PI, 2017–2021, £60k), “*Predictive Analytics for Short-term Wind and Solar Power Forecasting*”

I have brought together The DataLab (Scottish Innovation Centre) and Natural Power (leading renewable energy consultancy) to co-fund a PhD in advanced short-term wind and solar power forecasting, currently recruiting.

Knowledge Transfer Partnership, Romax Insight (Co-I, 2017–2019, £240k), “*Advanced wind turbine prognostics using machine learning*”

This KTP will transfer advanced analytical techniques developed at Strathclyde into Romax Insight’s leading commercial prognostic software.

TIC-Wind-03B (Co-I & Researcher, 2017–2018, £145k), “*Commercial Frequency Response from Wind.*”

Following a survey exercise (TIC-Wind-03), I scoped a this project to undertake research into near future commercial opportunities for wind to provide frequency services in GB. The scope included demand for different types of frequency response in for a range of future generation mix scenarios and market arrangements, the technical capability of wind turbines to deliver frequency services, and the impact of them doing so on asset health. As Co-I I managed one Research Assistant in addition to my own time as Researcher, and secured additional funding to expand the project when the need to do so was identified.

TIC-Wind-03, (Co-I & Researcher, 2016, £20k), “*Ancillary Services from Wind: Initial Survey of possible Technical and Economic Opportunities.*”

Following identification of ancillary services from wind as an area of interest by industrial partners I produced the scope for this survey project and managed its development with feedback from academics (PI and Co-Is) and industry partners. I delivered the project to positive feedback which led to a larger follow-on project TIC-Wind-03B

EPSRC Doctoral Prize, (Prize Winner & Researcher, 2015–2017, £100k), “*Optimal Operation of Wind Power Plant Informed by Probabilistic Forecasts.*”

I developed a one-year plan for independent research into applications of probabilistic forecasting, specifically participation in the GB electricity market and vessel dispatch for offshore maintenance. The award was made following an internal (to Strathclyde) review process and interview. This project was supported by two industrial partners, RES and SSE, who provided data and time in-kind. To date, I have produced two journal papers as first author, one as co-author, and four conference papers as part of this project, and geared this funding with 4 CDT summer projects and one PhD student.

## Awards

*Runner-up: Fuellers Future Energy Conference Research Presentation Competition 2019*

As a team with James Carroll, I was runner-up in this presentation competition collecting a cash prize and networking support with venture capital and angel investors.

*Runner-up: Offshore Renewable Energy Catapult Hackathon 2019*

As a team with Ciaran Gilbert, Leo May and Adam Stock, I was runner-up in this hackathon, the aim of which was to develop algorithms for producing accurate ‘power available signals’ for wind farms. The event was run by OREC and sponsored by Scottish Power Renewables and National Grid ESO.

*Winner of the EEM 2017 Wind Power Forecasting Competition*

As a team with Ciaran Gilbert, I won this forecasting competition beating international teams from both academia in industry. Our method, based on regime-switching autoregression, was presented at the EEM conference and in an invited paper. This success was reported in national press and has boosted my profile within the energy forecasting community.

*Glasgow Research Partnership in Engineering (PI, 2017, £4k): “Probabilistic Solar Power Forecasting.”*

I secured funding for a 6 week postdoctoral researcher exchange to the National Renewable Energy Laboratory, Golden, CO, to collaborate with Bri-Mathias Hodage on aspects of IEA Wind Task 36 and to develop novel techniques for solar power forecasting, May–June 2017.

*International Institute of Forecasters Travel Award Grant (2016, US\$1k)*

Support to attend International Symposium on Forecasting and present a paper on forecasting for participation in electricity markets.

*Glasgow Research Partnership in Engineering, (PI, 2016, £2k), “Production and Use of Probabilistic Wind Power Forecasts.”*

I won funding post doctoral exchanges to visit international collaborators Ricardo Bessa (INESC-Tech, Porto), and Pierre Pinson (DTU, Copenhagen) to undertake research into to production and use of wind power forecasts. With Ricardo Bessa, I studied scenario forecasting and co-authored a paper on very-short-term forecasting with him and his colleagues. With Pierre Pinson, I studied game theoretic aspects of single-price balancing markets along with Athanasios Papakonstantinou, we are currently writing a paper on this subject together.

*Finalist: Scottish Renewables Young Professionals Green Energy Awards, Academic Category, 2015.*

I was nominated by my peers for an award administered by the Scottish Renewables, the renewables trade body in Scotland.

*Outstanding student paper award, PMAPS Conference, 2014.*

For a paper titled “Spatio-temporal prediction of wind speed and direction by continuous directional regime.”

*COST Action ES1002 WIRE: Scientific Mission, Visit to DTU/Prof Pierre Pinson (PI, 2013, £2k), “Spatio-temporal Aspects of Probabilistic Wind Power Forecasting.”*

I was awarded funding for a 3 month PhD exchange visit Pierre Pinson (DTU, Copenhagen) to undertake research into to production of probabilistic wind power forecasts. During this trip I developed a sparse VAR method for very-short-term wind power forecasting which was the first work addressing large-scale challenges in wind power forecasting to be published internationally.

## Research Supervision and Management

- RA** Ciaran Gilbert (PI, 2020–), Electricity demand forecasting  
 Thomas Alexander (PI, 2020–), Electricity price forecasting  
 Robert Graham (PI, 2020–), Meteorology, S2S hydro power forecasting  
 Susan Brush (Co-I, 2020, 3 months), GB ancillary services  
 Fulin Fan (PI, 2018, 5 months), Hydro power forecasting  
 David Murray (PI, 2017–2018, 5 months), Electricity demand forecasting  
 Euan MacMahon (Co-I, 2017–2018, 4 months), Ancillary services  
 Marcel Nedd (Co-I, 2017–2018, 9 months), Ancillary services  
 David Hamilton, (Co-I, 2017, 2 months), Consultancy
- PhD** Leo May (First Supervisor, 2018–...), *“Forecasting and Analytics for Offering Frequency Response from Wind,”* Wind & Marine Energy CDT.  
 Rosemary Tawn (First Supervisor, 2018–...), *“Predictive Analytics for Short-term Wind and Solar Power Forecasting,”* industry sponsored PhD with Natural Power and The DataLab.  
 Ciaran Gilbert (First supervisor, 2016–...), *“Topics in High Dimensional Energy Forecasting,”* Wind & Marine Energy CDT.  
 Joanna Sobon (Second Supervisor, 2019–...), *“Operation of Energy Storage in Micro-grids”*  
 Alice Malvaldi (Mentor, 2014–...), *“Spatio-Temporal Prediction of Wind Based on Wind Velocity and Related Parameters,”* Wind Energy Systems CDT.
- MSc** Pablo Benavides López (Visiting Strathclyde from Technical University of Denmark, 2018), *“Probabilistic Electricity Price Forecasting.”*
- MRes** Leo May (Wind & Marine CDT, 2018), *“Very short-term power forecasting at Horns Rev 1”* with Vattenfall.  
 Ahmed El-Bozie (Wind & Marine CDT, 2017), *“Probabilistic Forecasting of Maximum Wave Height.”*  
 Patrick McGuckin (Future Power Networks CDT, 2017), *“Solar Power Forecasting and Operation of Combined Solar and Battery,”* with British Solar Renewables.  
 Sofia Koukoura (Wind & Marine CDT, 2016), *“Hierarchical Wind Power Forecasting.”*  
 Ciaran Gilbert (Wind & Marine CDT, 2016), *“Price Forecasting for Participation in Electricity Markets,”* with RES Ltd.  
 Owain Roberts (Wind & Marine CDT, 2015), *“Evaluation of the benefits for a utility to improve wind power forecast skill for market participation,”* with EDF Energy.  
 Alice Malvaldi (Wind Energy Systems CDT, 2014), *“Wind Prediction Enhancement by Supplementing Measurements with Numerical Weather Prediction Now-Casts.”*  
 Hamish Macdonald (Wind Energy Systems CDT, 2013), *“Wind Prediction Enhancement by Environmental Parameters.”*

## Presentations, Seminars and Conferences

(Not associated with conference publications.)

- Invited**
- *“Spatio-temporal Aspects of Probabilistic Wind Power Forecasting,”* IEEE Power & Energy Society General Meeting, Special Panel Session, Atlanta, GA, USA, 2019.
  - *“Improved very shortterm spatiotemporal wind forecasting using atmospheric regimes,”* International Conference on Energy Meteorology, Copenhagen, Denmark, 2019.
  - *“IEA Wind Recommended Practices for Selecting Renewable Power Forecasting Solutions Part 3: Evaluation of Forecasts and Forecast Solutions,”* (poster), International Conference on Energy Meteorology, Copenhagen, Denmark, 2019.
  - *“Session Chair and presenter: Energy Forecasting,”* International Symposium on Forecasting, Thessaloniki, Greece, 2019.
  - *“Aspects of High Dimensional Energy Modelling and Forecasting,”* Isaac Newton Institute Programme: Mathematics of Energy Systems, Cambridge, UK, 2019.
  - *“Energy Forecasting — Perspective from Europe and Academia,”* IEEE Power & Energy Society General Meeting, Special Panel Session, Portland, OR, USA, 2018.

- “*Temporal Structure in Short-term Solar Power Forecasting*,” University of Lancaster, Lancaster, UK, 2018.
- “*Regime-switching Spatio-temporal Wind Forecasting using Atmospheric Modes*,” University of Oxford Mathematical Institute, Oxford, UK, 2017.
- “*Improved Very-short-term Wind Forecasting using Atmospheric Classification*,” National Oceanic and Atmospheric Administration, Boulder, CO, USA, 2017.
- “*Probabilistic Energy Forecasting and Applications*,” National Centre for Atmospheric Research, Boulder, CO, USA, 2017.
- “*Probabilistic Energy Forecasting and Applications*,” National Renewable Energy Laboratory, Golden, CO, USA, 2017.
- “*Short-term Wind Power Forecasting*,” National Grid Electricity Transmission, Wokingham, UK, 2017.
- “*Strategic Participation of Stochastic Generators in Single-price Balancing Markets*,” Electricity Markets and Analytics Group, Technical University of Denmark, Copenhagen, Denmark, 2016.
- “*An Introduction to Wind Power Forecasting*,” European Academy of Wind Energy, 10th PhD Seminar on Wind Energy in Europe, Orléans, France, 2014.
- “*Short-term probabilistic Wind Power Forecasting*,” European Energy Research Alliance, Smart Grid Joint Programme, Glasgow, 2014.
- Pres.** • “*Atmospheric Regimes for Improved Very Short-term Wind Power Forecasting*,” International Conference on Energy Meteorology, Copenhagen, Denmark, 2019.
- “*Probabilistic Energy Forecasting and Applications*,” Royal Statistical Society Conference, Glasgow, UK, September, 2017.
- “*Short-term O&M Risk Management when using Cranes*,” Wind Energy Science Conference, Copenhagen, Denmark, 26–29 June, 2017.
- “*Large-scale Very-short-term Spatio-temporal Forecasting by Sparse Vector Autoregression*,” EWEA Wind Power Forecasting Technology Workshop, Leuven, Belgium, 1-2 October, 2015.
- “*Large-scale Very-short-term Spatio-temporal Forecasting by Sparse Vector Autoregression*,” Wind Engineering Society Research Day, Reading, UK, 2015.
- “*Spatio-temporal Wind Forecasting*,” (poster), Durham Risk Day, Durham, UK, 2014.

## Other Research Activity

- 2020** *Heilbronn Visitor in Data Science, University of Bristol, UK.*
- One month as visiting researcher working on generalised additive models and applications in energy forecasting.
  - Hosted by leading Statistical Science group at the University of Bristol.
- 2019** *Visiting Fellow, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.*
- Programme Title: “*Mathematics of Energy Systems*”
  - I was a visiting fellow for 4 weeks of this prestigious research programme.
  - Outputs I am involved with include plans a journal article (in development) and the creation of an energy-related data science competition platform ‘*Rangl*’ to be launched in 2020.
- 2017** *Visiting Researcher, National Renewable Energy Laboratory, USA.*
- Project Title: “*Probabilistic Solar Power Forecasting*.”
  - I secured a £4k travel grant from the Glasgow Research Partnership in Engineering to visit NREL for 2 months to work with Bri-Mathias Hodge on solar power forecasting and contribute to IEA Wind Task 36.

## Teaching Activity

- 2018** *EES-UETP: Statistical Learning for Uncertainty Forecasting*
- I will give a half-day seminar on statistical learning for probabilistic forecasting as part of a 3-day electric energy systems university enterprise training partnership course aimed at PhD students and postdocs.



**2017–2019** *Data Science for Environmental Modelling and Renewables—MOOC*

I am part of a group of academics from the Universities of Glasgow and Strathclyde who have produced a 6 week ‘massive open online course’ on data science applications in sustainability in response to a call for such courses from The DataLab (Scottish Innovation Centre). I produced and manage a one-week section on energy forecasting. In its first year the course ran on [FutureLearn](#) attracted over 1 400 learners and will run again in 2019.

**2016–2017** *Post-graduate Certificate in Academic Practice, accredited by Higher Education Academy*

I have undertaken professional development courses in teaching and learning practices in higher education, including theoretical and practical aspects of teaching, activity design, and course evaluation.

**2016–...** *Tutor, EE107, Electrical Engineering; BSc & MEng*

I take a weekly small-group tutorial with first-year EEE students and guide them through a range of technical and transferable skills activities.

**2017–...** *Assessor, Electrical Engineering Student Projects; BSc & MEng*

I have acted as an assessor of undergraduate students’ 4th year individual project presentations.

**2016–...** *Guest Lecturer, Wind and Marine Energy Systems Centre for Doctoral Training*

I deliver a 10-hour course on wind power forecasting to PhD students, including a practical forecasting exercise of my own design. The course covers aspects of meteorology and statistical methods.

**2015–...** *Guest Lecturer: EE577–977–988; MEng & MSc*

I deliver lectures on wind power forecasting and participation of wind the GB electricity markets to 5th year undergraduates and master’s students.

**2012–...** *Teaching Assistant: EE317, EE577–977–988; BSc, MEng & MSc*

I assist in the delivery of a *GH Bladed* computer lab, contributed to the lab design in 2012 and continue to develop the material. I assist in whole-class tutorials.

**2012–2015** *Educational Outreach: Glasgow Schools, Science Centre and Science Festival*

In my role as Public Outreach Coordinator for the Wind CDT, I designed and delivered a range of outreach activities for school visits and installations at the Glasgow Science centre. These including a power system card game and ‘build your own wind turbine.’ I also organised a public debate on the subject of wind energy featuring academics, industry representatives and campaigners as part of the 2014 Glasgow Science Festival.

## Knowledge Exchange Activity

**Consulting** Regular consultancy with UK and European utilities and government departments on forecast improvement, evaluation and participation in GB electricity markets.

National Grid ESO (PI, 2019, 4 months, £30k), “*Power Available Signal Accuracy*”

I lead this project to develop a method of assessing the accuracy of power available signals from wind farms and setting a national accuracy standard. This is a key part of developments in the regulatory environment to enable wind farms to participate in ancillary service markets in GB.

Vattenfall (PI, 2018, 3 months, £16k), “*Forecast Improvement*”

Acted as a consultant on an internal forecast improvement project at Vattenfall, a Swedish Utility with over 2.7GW of wind capacity across five countries.

ScottishPower Renewables (PI, 2018, 1 month, £7k), “*Pricing High Frequency Response from Wind*”

I was approached by SPR to carry out this piece of bespoke analysis to support commercial activity in the frequency response market.

ScottishPower Renewables (Co-I, 2018, 6 months, £60k), “*Black Start from Wind*”

I brought together an industrial partner and academic expertise to deliver a study on the possible role wind farms could play in the GB power system’s black start strategy.

ScottishPower Renewables (Co-I & Researcher, 2017, £8k), “*SPR Imbalance Analysis*”

I led this piece of bespoke analysis of ScottishPower Renewables’ portfolio and its exposure to imbalance risk in the GB electricity market, managing one RA.

**Forecasting** *National Grid Electricity Transmission, GB TSO*

I am in regular contact with key personal at NGET, including members of the Forecasting Team and control room staff. I have consulted with them on aspects of forecasting methodology related to the operational challenges they face. I have developed a project with NGET to design a very-short-term forecasting system to form an integral part of the £100m EBS automated control system currently being developed by NGET and ABB. I will be co-investigator on this project which is expected to start in summer 2017 and has a value of £140k.

*SSE, Large Utility, UK & Ireland*

I regularly interact with the forecasting team at SSE and have advised on forecast evaluation. SSE have supported my research and that of my students with in-kind data provision. I have aims to implement some of the techniques developed as a result within SSE.

*Vattenfall, Large Utility, Europe*

I collaborate with the R&D department at Vattenfall on wind power forecasting. Vattenfall are supporting PhD student Ciaran Gilbert and MRes students. They have the internal infrastructure to implement techniques that are developed through collaboration. I aim to monetise this relationship by supporting a company-wide forecast improvement project in the near future.

**O&M** *Romax InSight, Service Provider, Operate Internationally*

Through the project ‘Optimisation of Wind Energy O&M Decision Making Under Uncertainty’ I have been exchanging knowledge with Romax to develop state-of-the-art decision support based on Romax’s in-house condition monitoring technology and providing Romax with knowledge of the underlying statistical methods required to do so. The tools we have developed are expected to be commercialised in 2018.

*SSE/Greater Gabbard, Offshore Wind Farm Operator*

I am engaged with SSE regarding O&M scheduling for offshore wind farms and am pursuing several project on this front, including the use of existing and new sensors to improve access forecasts, and the incorporation of advanced numerical wave prediction with SME Weatherquest. One funding application is submitted and another in preparation.

**Markets** *RES Ltd, Developer/Operator, International*

I developed a range of algorithmic trading strategies in partnership with RES while the company was exploring options to begin trading their own energy rather than rely on PPAs. The company decided not to trade their own power in GB but are considering doing so in France.

*TIC LCPE: SSE, Iberdrola & Wood Group, Large Utilities and Consultancy, International*

Through TIC projects Wind-03 and Wind-03B I have worked with SSE and Iberdrola to identify commercial opportunities for their wind assets to participate in ancillary service markets, and to develop novel operational strategies for them to do so. This work was directly funded by the partners and is on going.

**Professional Membership**

- IEEE** Student Member 2015, Member 2016–present, inc. membership of the Power and Energy Society and PES Working Group on Energy Forecasting.
- CIGRE** ‘Next Generation Network’ Member, 2017–present.
- RSS** Fellow of the Royal Statistical Society, 2017–present.
- HEA** Fellow of the Higher Education Academy, 2017–present.
- IIF** Member of the International Institute of Forecasters and Secretary of the UK Chapter, 2019–present.
- WEMC** Member of the World Energy Meteorology Council, 2019–present.
- ONS** Office for National Statistics Accredited Researcher number 2000556.

**Citizenship****External** *Funding reviews*

I have acted as a reviewer for two non-UK national funding bodies.

*IEA Wind: Task 36, 2017–present*

I am an active participant in this International Energy Agency task on the production and use of wind power forecasts. In particular, I am an editor of the ‘IEA Recommended Practice’ document on wind power forecasting and contributed to multiple journal articles on wind power forecasting research.

*Supergen Energy Networks Hub Markets & Regulation Working Group, 2019–present*

I am member of this working group contributing to the running of the SEN Hub, which is trying to answer questions such as ‘How markets and regulations should be developed to optimise and coordinate resources across different energy vectors, and deliver decarbonisation and resilience against rapidly changing energy landscapes?’

*Secretary, International Institute of Forecasters UK Chapter, 2019–present*

I am secretary of this national group which coordinates activities for UK-based researchers and practitioners of forecasting, including organising quarterly seminars.

*PhD Examination (External)*

M Groch, Stellenbosch University, 2019: “*Modelling and Short-Term Forecasting of High Wind Speed Events at Operational Wind Farms*”

*Event Organisation*

I have organised numerous workshops and events including for PowerSwarm, Risk Day (one-day conference) and the Quarterly Forecasters Forum.

*Conference Session Organiser/Chair*

International Symposium on Forecasting (2016, 2019), EAWE PhD Seminar (2015).

**Internal***Researcher Forums, 2015–present*

I engage with University policy makers through participation in focus groups and surveys to give feed-back on University policy regarding research staff.

*Public Outreach Coordinator, PETS Committee, 2014–2015*

I coordinated a wide range of public outreach events and contributed to the running of the student-led Professional Engineers Training Society.

*Member, Futurewind Committee, 2014–2015*

I contributed to the organisation and running of the Futurewind conference with a responsibility for managing event registration and communication with attendees, and chairing sessions during the event.