

CURRICULUM VITAE

NAME: David Graham Infield
DATE and place of BIRTH: 30/03/54, Paris, France

EDUCATION and QUALIFICATIONS:

1976-1979 University of Kent, Canterbury
PhD in Applied Mathematics - 'Junction Conditions in General Relativity.'

1973-1976 University of Lancaster
Combined Honours in Mathematics and Physics (BA): II(i)

1970-1972 Imberhorne Comprehensive School
'A' Levels - Mathematics, Physics, Chemistry.
'S' Level - Physics

1965-1970 East Grinstead Grammar School
8 'O' Levels

PREVIOUS WORK EXPERIENCE:

1979-1982 Building Services Research and Information Association, Bracknell - Research Engineer
Main research areas: active solar heating design assessment procedures and control including an evaluation of thermal energy storage; thermal building response modelling; heat reclamation and CHP design aspects.

1982-1987 Rutherford Appleton Laboratory (RAL), Chilton - Research Associate
Duties included research in wind energy, collaboration with universities and international research bodies, and the supervision of more junior staff. His research emphasis was on wind energy systems analysis and the related topic of energy storage. From 1984 to 1986 he was part-time seconded to Strathclyde University as a Lecturer in the Department of Applied Physics with lecturing, research and supervisory duties.

1987-1993 Energy Research Unit (at RAL), Chilton - Senior Scientific Officer
Manager of RAL wind Test Site (a central facility for use by HEI's). In this capacity he was actively involved in a wide range of theoretical and experimental work, mainly in collaboration with researchers from HEI's and also with industrial organisation. In addition he worked closely with overseas institutions with considerable support coming from the CEC.

1993-2007 Loughborough University, Director of CREST (Centre for Renewable Energy Systems Technology).
Manager of RAL wind Test Site (a central facility for use by HEI's). In this capacity he was actively involved in a wide range of theoretical and experimental work, mainly in collaboration with researchers from HEI's and also with industrial organisation. In addition he worked closely with overseas institutions with considerable support coming from the CEC.

CURRENT POSITION: **Professor of Renewable Energy Technologies**
Institute of Energy and Environment
University of Strathclyde
Royal College Building
204 George Street
Glasgow G1 1XW

UNIVERSITY APPOINTMENTS

Loughborough

Member of Loughborough University Senate	1996 - 2000
Programme Director for Renewable Energy Systems Technology MSc	1996 - 2004
Energy research contact for liaison with British Gas research/Advantica	1996 - 1998
Programme Director for European Masters in Renewable Energy	1998 - 2004
Head of Power and Renewable Energy Division	1998 - 2002
Programme Director for MEng in Electrical Power and Renewable Energy	1999 - 2004
Sustainability School Management Committee member	2006 - 2007

Strathclyde

Chair of Departmental Postgraduate Taught Liaison Committee	2007 - 2010
Manager of Centre for Doctoral Training in Wind Energy Systems	2008 - present
Coordinator of Strathclyde return to EPSRC International Energy Review	2011

EXTERNAL APPOINTMENTS

British Wind Energy Association Council Member	1988 - 1997
BWEA Small Wind Committee secretary	1988 - 1989
Member of BSI Panel PEL/123/-/2-	1992 - 1996
UK expert on IEA Annex on wind turbine aerodynamics	1993 - 1997
Member of EPSRC College of Assessors (Electrical Programme)	1995 - present
Member of IEC working group: Standards for small wind turbines	1996 - 2000
External examiner to DeMontfort University	1997
Member of BSI Committee GEL/82 on PV	1998 - present
Member of IEC Committee on PV Standards (WG6)	1998 - present
External examiner to Strathclyde University	1998
Editorial Board member for the International journal, Wind Energy	1998 - 2007
Editorial Committee member for Int. Journal of Renewable Energy Engineering	1998 - 2004
External examiner to Lancaster University	1998
Member of CIBSE PV Committee	1999 - 2000
External examiner to DeMontfort University	1999
Consultant to DGXII of the European Commission	1999
Member of European Wind Energy Conference Scientific committee	1999 - present
UK lead partner for British Council HE Link with Bangladesh	1999 - 2004
External examiner to University of Newcastle	2000
Member of Leicester City environmental planning think tank	2000 - 2004
Academic committee member for Energy MSc at EPFL, Lausanne	2000 - 2006
Consultant to DGXII of the European Commission	2001
Co-organiser of International Conference on Renewable Energy, Dhaka	2001
UK lead partner for British Council HE Link with Cuba	2001 - 2005
External assessor for USDA	2001 - present
Management board member for European Interest Group EUREC	2001 - 2007
External examiner to Indian Institute of Technology, Delhi	2002
External assessor for NSERC/CRSNG	2002 - present
Member of Industrial Steering Committee for INREB Faraday Partnership	2002 - 2005
External assessor for DTI New and Renewable Programme	2003 - 2006
External referee for Professorship at University of Stuttgart	2003
External examiner to University of Belfast	2003
Referee for IEEE Transactions	2003 - present
External referee for Professorship at University of Exeter	2004
UK member of CENELEC Standards committee on PV (CLC TC 82)	2004 - present
Invited member of the Royal Society's Energy Policy Committee	2004 - present
Member of UKERC New Energy Sources team	2004 - 2008
External referee for Professorship at University of Leicester	2005

External assessor for research programme in Ireland	2005
External examiner for thesis for University of Cape Peninsular, South Africa	2005
Coordinator of Energy workshop for Royal Society's Africa Day	2006
Member of WG4 of EU Advanced Networks Platform	2005 – present
Member of EU TPWind	2006 – present
Member of UKERC Energy Review working group	2006
Advanced Networks EU Platform – working group member	2006 - present
External PhD examiner at Edinburgh, Newcastle and DeMontfort Universities	2006
Editor in Chief for IET Renewable Power Journal	2006 – present
External examiner for De Montfort University	2006
External examiner for Newcastle University	2006
External Assessor for Japan Society for the Promotion of Science	2006
Visiting Professor North China Electric Power University, Beijing	2007 - present
External examiner for Imperial College	2007
External examiner for Robert Gordon's University	2007
IPPC SREN Contributing Lead Author Wind Energy Chapter	2008 - 2010
UHI Research Committee member	2008 – present
External examiner for the Open University	2009
External assessor for major energy research infrastructure investment in Cyprus	2009
Grant award assessor for Science Foundation Ireland	2009 - present
Research capability reviewer for Lews Castle College (UHI)	2009
UHI Energy Research Group advisor	2009 - present
IPPC SREN Contributing Lead Author 5 th Assessment report	2010 – present
External examiner Imperial College	2010
Invited lecture for REN (the Portuguese System Operator) annual awards	2010
IET RPG Conference Chair	2011
External examiner Leeds University	2011
Visiting expert funded by Chinese government	2011 - 2016
Independent REF assessor for a leading UK University Engineering Department	2012
Assessor for Masters Degree in Renewable Energy at Groningen, Netherlands	2012
DSc assessor for Durham University	2012
PMAPS conference Scientific Committee member	2012
Research proposal reviewer for KU Leuven	2012
External MSc course reviewer for UNSW linked degree	2012
External PhD examiner for Imperial College, Dept. of Electrical Engineering	2012
External PhD examiner for Manchester University	2012
External reviewer of applicants for DTU Professor in Wind Systems and Control	2012

INVITED LECTURES AND OTHER INDICATORS OF ESTEEM

Lecture to IEE Professional course on Modern Electricity Supply Systems, Imperial College	1993
Lecture to course on Principles of Wind Energy Conversion, Imperial College	1994
Lecture to International Conference on Education and Renewables, Bangkok	1994
Lecture to course on Principles of Wind Energy Conversion, Imperial College	1995
Lecture to IEE Power Section Branch of North Wales on Wind Power	1996
Presentation to IEA meeting on Wind Turbine Aeroelastics, Technical University of Denmark	1996
Interview on BBC Breakfast Television regarding wind energy	1996
IEE Divisional Lecture: Renewable Energy Technology Development and Application	1997
Lecture series (British Council sponsored) on wind energy for University of Pernambuco, Brazil	1998
Renewable Energy Technology lecture to IEE Leicester branch	1998
Lectures to IEE Summer School on Power Generation	1999 - 2005
Wind Energy lectures for Postgraduate course on Energy at EPFL	1999 - 2006
Lecture on Renewable Energy to International Symposium, Havana	1999

Public lecture on Renewable Energy at Bangladesh University of Technology	1999
Presentations to CETER International Conference, Cuba	2001
Presentation on wind energy to CIRCE at University of Zaragoza	2001
Presentation at Faraday Partnership launch, London	2001
Presentation to Lord Ezra and Micro-Council on Distributed Generation	2002
Presentation on Domestic Energy Sources for IOP event	2002
Invitation to visit and review energy research at EPFL	2002
British Council sponsored visit to Cuba	2002
Lecture to Martin Centre staff and students on wind energy	2003
Member of DTI delegation to Japan for PV technology	2003
Poster prize from World Conference on Photovoltaic Energy Conversion, Osaka	2003
Lecture to Cambridge Summer School on Offshore Wind Energy	2003
Invitation to Faraday Directors Conference	2003
Presentation on Integrating renewables into Networks to IOP event	2003
Presentation to Leicester Business Voice	2003
Round Table Meeting with EU Energy Ministers and Business leaders, Sweden	2003
Lecture on PV to United International University, Bangladesh	2004
Presentation to Conference on Energy Infrastructure and Renewables, Brussels	2004
Overview lecture to National Swiss Energy Policy meeting, Zurich	2004
Invited lecture to Offshore Technology meeting, Inverness	2004
Lecture to Cyprus IEE Division on Renewable Energy	2005
Chair discussion at BRE Meeting on Building Integrated Wind Energy	2005
Rapporteur for OU Meeting on Renewables and Nuclear	2005
Invited lecture to Tsinghua University, Beijing	2005
Invited Panel Presentation to IEEE PES AGM/Conference, San Francisco	2005
Review Cuban Renewable Energy Research for British Council, Havana	2005
Lecture on Renewable Energy to IEE Division Malta	2005
Presentation on Wind Turbine Condition Monitoring to NREL Symposium	2006
Member of EPSRC energy delegation to South Africa	2006
Invited lectures to UCL study weekend at the Royal Hunting Lodge, Windsor Great Park	2006
Organiser of Renewable Energy meeting at the Royal Society's South Africa Day	2006
Keynote lecture to BRE meeting on Building Integrated Wind Energy	2006
Invited lecture on Wind Energy to IEEE PES meeting, Montreal	2006
Co-leader of Sino-UK Renewable Energy Meeting, Shanghai	2006
Invited lecture on PV to Finnish Physics Society, Helsinki	2007
Invited lecture on PV to BRE	2007
Invited lecture CAST meeting Chongqing	2009
Presented Strathclyde Energy Research to EPSRC's International Energy Review	2009
Invited wind lecture to Queen Mary College	2009
Invited lecture for REN (the Portuguese System Operator) annual awards	2010
Invited lecture to Department of Automation and Control, NCEPU, Beijing	2011
Participated in UK Smart Grid Mission to Asia (China, Taiwan, S Korea)	2011
Chair of First IET RPG International Conference, Edinburgh	2011
Invited to lecture to Datang Company, Beijing, on offshore wind engineering	2012
Invited to lecture to Hohei University, Nanjing	2012
Invited to lecture to Zhejiang University	2012
Invited to lecture to Nanjing University of Science and Technology	2012
Invited lecture to CEPRI, China State Grid, Beijing	2012
Co-chair of Second IET RPG International Conference, Beijing	2013
Assessor of proposals to Polish-Norwegian Research Programme	2013

PROFESSIONAL SOCIETY MEMBERSHIP

Fellow of Institute of Physics and Chartered Physicist (CPhys) (awarded 2012)
Senior member of IEEE (elected 2005)
Member of British Wind Energy Association

PRIZES and AWARDS

1997 - British Wind Energy Association, Wind Energy Pioneer award.

1998 - American Wind Energy Association award for contributions to Wind Diesel research.

2003 - Best poster prize for: Johansson, A., Gottschalg, R. and **Infield, D.G.**, "Modelling Shading on Amorphous Silicon Single and Double Junction Modules" , *3rd World Conference on Photovoltaic Energy Conversion* , Osaka, Japan, 2003, CD ROM, ISBN 4-9901816-3-8.

2011 - Institution of Civil Engineers Baker Medal for: I. Staffell, P. Baker, J. P. Barton, N. Bergman, R. Blanchard, N. P. Brandon, D. J. L. Brett, A. Hawkes, **D. Infield**, C. N. Jardine, N. Kelly, M. Leach, M. Matian, A. D. Peacock, S. Sudtharalingam and B. Woodman; UK microgeneration. Part II: Technology overviews; *Energy*, Volume 163, pp 143-165, 2010.

SUMMARY OF RESEARCH AND DEVELOPMENT CONTRIBUTIONS PRIOR TO JOINING STRATHCLDE

My years with BSRIA were concerned with applied research in the built environment. My background in Mathematics and Physics proved useful but this was an intense period of learning Engineering, primarily heat transfer and control. I made some useful contributions working alongside Oscar Faber, the building services engineers, to the design of integrated solar air heating systems including a then advanced variable air volume control system, now widely used in such systems worldwide.

Moving to RAL required to work on wind energy in its early days gave me the opportunity to learn about the engineering of small power systems, from both the mechanical and electrical point of view. I became an expert in wind diesel systems, working closely with Hawker Siddeley Power Plant, and later Dale Electric Ltd and Laings, to develop prototype systems. Wind diesel technology proved hard to commercialise, mainly because of the lack of financial resources available to those who most needed the power. Nevertheless, the integrated designs to which I contributed remain of commercial interest overseas, particularly in the USA and now there is a growing interest in such mini-grids for power supply in rural Africa.

My work at RAL developed in the direction of wind turbine technology with an emphasis on unsteady aerodynamics and aeroelastics and I became part of the international effort to improve wind turbine modelling that now underpins current turbine design. With partners at Heriot-Watt I pioneered the application of Particle Image Velocimetry (PIV) to aerodynamics and rotor aerodynamics in particular. We were the first to publish measured flows through rotors showing blade bound circulation and also wake effects. Similar techniques were subsequently applied by DLR in Germany and NASA in the USA.

I went on to apply the understanding of wind turbine dynamics to the development of condition monitoring for wind turbines. This ground-breaking work has led on to an active programme of research into condition monitoring specifically for wind turbines. It is now acknowledged that advanced diagnostic systems are essential for reliable offshore wind turbine operation and research undertaken in close cooperation with manufacturers is now underway at Loughborough.

I joined Loughborough University in 1993 to establish a new centre. This continues to be known as CREST (Centre for Renewable Energy Systems Research) and its aims are to:

- Contribute to the development and implementation of renewable energy through high quality research and demonstration
- Work with research institutions, industry and related organisations at home and abroad to promote renewable energy
- Provide training and education in both theoretical and practical aspects of renewable energy systems technology

CREST grew significantly in size and reputation under my direction over my 13 years at Loughborough. When I left in September 2007 the centre had 20 staff of which 4 were permanent academic posts, 22 PhD students, was teaching around 100 MSc students each year (some by Distance Learning), and had a research portfolio of over £3 million (not all of this directly mine). My personal research activities at Loughborough were focused on wind and photovoltaic (PV) energy generation, with a particular emphasis on integration into electricity supply systems. In the last years there I expanded this to include the general issue of generation capacity embedded in the electricity distribution system, whether renewable or conventional, and the building integration of PV with its associated thermal modelling challenges. During my time at Loughborough University I personally attracted research contracts from EPSRC, DTI, CEC, and industry worth a total of over £3 million. These included a significant number of small to medium sized projects, and some lucrative commercially supported research projects. Throughout my time at Loughborough I developed strong links with industry and almost all my research was carried out in close collaboration with commercial partners. Industry contributed substantially to the building at Loughborough, under my direction, of the UK's largest PV and most sophisticated PV research and development laboratory, including state of the art deposition and materials processing equipment alongside the a comprehensive suite of analysis equipment including ellipsometry, SEM, etc.

The MSc in Renewable Energy Systems that I developed and managed is widely regarded by the renewables sector as the international market leader. Since 1994 over 400 students were graduated and many now hold senior posts in organisations across the UK and overseas. Contacts in the wind energy sector indicate that the CREST graduates were considered first when new posts are being created. In addition, I ran an annual one week wind energy course for the industry. This course was a response to the growing demand for more advanced wind engineering knowledge and skills by the sector. I have also run bespoke wind training events for specific wind developers.

Alongside my University research I regularly undertook consultancy work for industry: clients include E.ON, British Gas, Solar Century, Marlec Engineering, and FKI.

We also completed some interesting work on small-scale wind/PV powered sea-water desalination systems. In contrast to previous approaches we demonstrated that a system with battery storage could be designed without degradation in system efficiency. A pre-production prototype was developed and this was short-listed for the ALTRAN prize in 2003. There continues to be commercial interest in our design.

There has been increasing interest in Building Integrated Wind and I have worked with a number of commercial companies on prototype development. In addition MSc students have carried out projects of direct relevance. In 2005 I chaired a session at the BRE conference on Small Wind and gave a paper at the 2006 BRE event on Building Integrated Wind.

In my time at Loughborough I attracted a total of over 30 PhD students, most of these funded by EPSRC or other external funding including a number directly funded by industry. To date most of these have successfully completed their PhD theses under my direct supervision.

I negotiated CREST's membership of EUREC, an exclusive grouping of the leading European renewable energy research centres, and have recently been appointed to the management board. This reflects the scale and quality of the research activity that I established at Loughborough. Together with EUREC I put together the EU's first European Masters degree in Renewable Energy, this ran for the first time in 2002/3 and is now attracting many well qualified applicants; the programme involves a number of Europe's leading Universities including Ecole Des Mines de Paris, and NTUA.

A particular success in those years was establishing the Faraday Partnership for Integration of New and Renewable Energy in Buildings (INREB) together with a limited number of leading UK research institutes. This Partnership had wide industrial and commercial support and has since evolved into a DTI Knowledge Transfer Network led by BRE.

MY RESEARCH AT STRATHCLYDE

I joined Strathclyde University, one of the EU's leading centres for electric power generation, in September 2007 and have now established productive research links across many Departments of the University and built up a substantial research portfolio. There have been a number of early success including a number of grants related to the DSM potential of electric vehicles; a platform grant from EPSRC for renewable energy integration, and together with Professor Bill Leithead, the Doctoral Training Centre (DTC) in Wind Energy Systems. More recently there have been substantial EPSRC grants covering the transition of the UK electricity system to sustainable generation and a UK-India grant on PV systems performance, TSB funded research on electric vehicle charging strategies, and ETI funding for wind turbine condition monitoring. I have played an important role in building strategic research collaborations with the major electricity suppliers in Scotland under the framework of the Technology Innovation Centre and as part of this have built up a strong research activity on wind turbine asset management and also further work on condition monitoring including support from EDF, E.ON and Vattenfall.

In wind energy, my personal research is focussed on:

- Wind turbine power curve testing;
- Control and system integration of wind turbines with focus on frequency support services;
- Wind resource prediction and assessment including spatial-temporal wind field modelling;
- Condition monitoring for wind turbines, in particular using SCADA data;
- Wind farm performance modelling and output prediction;
- Demand side management for wind, including energy storage technologies.

I have assisted a number of companies in the design and testing of small turbines. I was invited to chair discussion on building integrated wind at a national events organised by BRE in 2005 and presented an invited paper to the follow on event in 2006. I sit on TUV-NEL's wind turbine testing accreditation oversight group. Most of my research these days is however concerned with large scale turbines for offshore.

I am the Manager of the Wind Energy Systems Doctoral Training Centre at Strathclyde. This was the outcome of a successful highly competitive bid made to EPSRC in 2007. Over 30 CDT students are now in place PhD with an increasing number directly funded by Industry (EDF and Gamesa in particular). Almost all the PhD topics come from industry. There is a particular emphasis on working with industry to scale up the technology from established turbines in the range 2 to 5 MW, up toward the sizes required for future offshore operations, ie 6 to 10 MW, and of installing operating this technology offshore. This is very challenging engineering and requires applied research of the highest level. There is also a strong research theme of wind integration into power systems, undertaken with SSE, Scottish Power, NG and others. It is pleasing that the growing reputation of the Doctoral Training Centre is increasingly drawing the industry to us to provide engineering solutions to their problems. I work directly with both SSE and SP to support their Technology Innovation Centre participation. Indeed most of my research is undertaken in close collaboration with industry. I am the HiDEF Supergen consortium PI; a project concerned with highly distributed energy futures and supported a large number of UK companies including SSE, SP, Rolls Royce etc.

I play my part in the support of national institutions and the UK Government. I advice DECC on research priorities; I also assisted Government select committees in the area of renewable energy research policy and a few years ago took the lead in assembling evidence on renewables for the UK DTI Energy Review, and for the House of Commons Science and Technology Committee (both in conjunction with UKERC).

I have a strong international presence: I'm Editor in Chief of the IET journal Renewable Power Generation (I was founding editor of this journal which is now well established with a high and growing international impact); I participate in the EU Wind Platform and the Smart Grids Platform, supporting the CEC in drawing up research policy in these two related areas; I have acted as an independent assessor for the CEC and a number of overseas agencies and Universities (including SFI in Ireland, the Canadian, US and Cypriot Governments, and the University of Stuttgart); I am Visiting Professor at North China Electric Power University and a Chinese

Government funded visiting expert over the next 5 years; for many years I was a guest lecturer at EPFL in Lausanne; I represent the UK on relevant international standards committees (see below); and I'm a DECC sponsored Lead Author on the IPCC (Intergovernmental Panel for Climate Change). I also lead the Strathclyde team supporting Sir Gordon Wu and Hopewell Engineering in Hong Kong with the development of a very large HAWT turbine. A 300kW prototype is presently under test in China. I also have an established link with the two senior Academicians at the Chinese Academy of Engineering, and in particular with their Energy Committee.

New Standards are a key to the effective commercial development of technology. I have been an active member of the International Electro-technical Committee TC82, concerned with photovoltaics, for many years. I also represent the UK PV sector on the associated CENELEC and BSI committees. My earlier research on the grid connection of PV, particularly on harmonics and islanding underpins key elements of the Standards, including the UK document G83. Other research that I have pioneered with colleagues in the past concerns the real world performance of PV systems and in particular the influence of solar spectra. The results of this work are now accepted by the international community and will lead to Standards that underpin more accurate electricity yield estimates from PV systems, essential for purchaser confidence in the technology.

My most important present external research relationships and the topics of research emphasis are listed in the table below:

Commercial Partners	My contribution
Moog Insensys led consortium (including Seebyte, E.ON and EDF)	Advanced algorithms for offshore wind turbine condition monitoring
SSE	Offshore O&M modelling and optimisation; Inertial frequency response modelling and assessment; Demand side management of domestic electricity loads for wind integration (through NINES project)
Scottish Power Renewables	Inertial frequency response modelling and assessment; Use of SCADA data for wind turbine condition monitoring
Romax	Advanced drive train modelling to reduce bearing failure rates
Datang (Chinese power plant designers)	Advanced level training in offshore operations and maintenance modelling and analysis
E.ON	Assessment of potential of electric vehicles for wind integration through demand side management
North China Electric Power University	I am establishing a new laboratory together with Professor Liu specifically for offshore wind turbine operations management, including test rigs for assessing new condition monitoring technologies
China State Grid (CEPRI)	This relationship is recent but developing fast around the challenge of wind integration
UMASS, Massachusetts, USA	A long standing collaboration on wind system modelling with Professors Manwell and McGowan
Riso/DTU	These are the world leaders in wind energy research and as would be expected I have a close relationship to a number of their leading researchers notably Helge Madsen, Martin Hansen and Henrik Bindner. These links cover my interests in wind turbine modelling and grid integration.

KEPCO/KEPRI – the S Korean Utility and national research laboratory	Demand side management technology for wind integration
SKF China	I have an NDA with SKF to undertake trials with them of wind turbine condition monitoring equipment
Envision, Chinese wind turbine manufacturer	I have an NDA with Envision to test condition monitoring software on their turbines
Guohua Energy Investment Corporation	One of my past Chinese students is now the Deputy Chief Engineer for this company's wind farm investments and the aim is to collaborate on wind farm management.
Vattenfall	Analysis of offshore wind farm data

My photovoltaics (PV) activity has declined since moving to Strathclyde in order to re-focus my research on wind. I was responsible for the management of PV research road mapping for the UK Energy Research Centre, the influential national energy centre support by the UK Research Councils. I have established a PV test system on the roof of the James Weir Building at Strathclyde and work closely with the ESRU team at the University. My research here is mainly on improved MPPT (Maximum Power Point Tracking) for PV systems and I participate in an EPSRC/India consortium to refine and commercialise the new technology we have developed and demonstrated.

As is expected of a University based researcher, my work is widely published in the professional literature with over a hundred refereed journal papers, and I am regularly requested to give presentations, join committees, write review articles and undertake other research related activities such as refereeing journal papers. International research links and presence are important and I have particularly strong research collaborations with Denmark, China, Korea, and the USA (as listed in the table above). I also have good research contacts in Universities and industry in Germany, Netherlands, Italy and Spain.

PRE 1992 PUBLICATIONS by YEAR

1983

D G Infield, **Small Scale Wind/Diesel Systems for Electricity Generation in Isolated Communities**; Proceedings of the 5th BWEA Workshop, Reading, Cambridge University Press, Cat No 4.
D G Infield & N H Lipman, **Energy Supply for Rural Applications - the UK Experience**; Proceedings of Conference C32 (ISES) - Rural Power Sources, Newcastle, Cat No 4.
D G Infield, G W Slack, H L Lipman & P J Musgrove, **Review of Wind Diesel Strategies**; IEE Proceedings, Vol 130, Pt A, No 9, Cat No 11.
P J Hobson & D G Infield, **Solar Air Heating Systems**; Report for Department of Energy - ETSU-S-1902, Cat No 14.

1984

D G Infield & J Puddy, **Wind Powered Electricity Generation on Lundy Island**; Energy for Rural and Island Communities IV, Ed Twidell J W, Pergamon, Cat No 4.
R Attwood, J Green, N H Lipman, D G Infield, J Magraw, R Forbes, M Percival, G Warner, L L Freris, A Tsitsovits & R Vinter, **The UK Isolated Wind System Project**; Proceedings of the 6th BWEA Workshop, Reading, Cambridge University Press, Cat No 4.
J A M Bleijs, N Jenkins, A Tsitsovits & D G Infield, **Some Aspects of Wind/Diesel Integration**; Proceedings of the 6th BWEA Workshop, Reading, Cambridge University Press, Cat No 4.
L L Freris, R Attwood, J A M Bleijs, D G Infield, N Jenkins, N H Lipman, A D Tipney-Hicks, A Tsitsovits & R B Vinter, **Autonomous Power System Supplied from Wind Diesel**; Proceedings of the 1st European Wind Energy Conference, Hamburg, Cat No 4.
D G Infield, **A Study of Electricity Storage and Central Electricity Generation**; Rutherford Appleton Laboratory Report RAL-94-045, Cat No 14.

1985

D G Infield, N H Lipman, J A M Bleijs, L L Freris, N Jenkins, A J Tsitsovits & R Attwood, **Current Progress in the Development of a Wind/Diesel System for Autonomous Electricity Generation**; Proceedings of the International Conference on 'Alternative Energy Systems: Electrical Integration and Utilisation', Pergamon, Cat No 4.
D G Infield, R Forbes, P Goodyer, N H Lipman, J E Magraw, R Reynolds, J A M Bleijs, L L Freris, N Jenkins & R Attwood, **Further Progress with Wind/Diesel Integration**; Proceedings of the 7th BWEA Workshop, Oxford, Mechanical Engineering Press, Cat No 4.

1986

J A M Bleijs & D G Infield, **Some Design Aspects of Wind/Diesel Systems Incorporating Flywheel Energy Storage**; Proceedings of the EWEC'96, Rome, Cat No 4.
D G Infield, **Contributions to 'Accuracy of Power Curve Measurements**; Ed Christensen C J and Dragt J B, Riso National Laboratory, Cat No 14.
D G Infield & J T White, UK Modelling Contributions to CEC Contract on '**Power Curve Compensations**'; ERU Report, Cat No 14.

1987

D G Infield & J A Halliday, **The Reading University/RAL National Grid Integration Model and its Application to Storage and Wind Energy**; Proceedings of a one-day meeting on the Economic and Operational Assessment

of Intermittent Generation Sources on Power Systems, Cat No 5.

A H Coonick, J A M Bleijs & D G Infield, **Wind/Diesel System with Flywheel Energy Store**; Proceedings of the Workshop on Wind/Diesel Systems, RAL Report, Cat No 5.

D G Infield, **Case Studies, Ch 9 in 'A Guide to Small Wind Energy Conversion Systems**; Ed Twidell J W, Cambridge University Press, Cat No 7.

D G Infield, **IEA Validation Exercise using ECN Wind/Diesel Data - Report on Validation of RAL Statistical Modelling Techniques**; ERU Report, Cat No 14, November.

1988

B Clayton & D G Infield (Ed), **Practical Aspects of Small Wind Energy Systems**; University College, London, Cat No 2.

D G Infield, J A M Bleijs, A H Coonick, J H Bass, J White, M Harrap, N H Lipman and L L Freris, **A Wind/Diesel System Operating with Flywheel Storage**; Proceedings of the EWEC'88, Herning, Cat No 4.

1989

A Coonick, J A M Bleijs, D G Infield, J A Bass, J T White, N H Lipman & L L Freris, **Summary of the RAL/ICSTM Wind/Diesel Flywheel Research Project**; Proceedings of the EWEC'89, Peter Peregrinus, Cat No 4.

D G Infield, **WECS Field Testing - Instrumentation**; Ch 17, Principles of Wind Energy Conversion, Ed Freris L L, Imperial College, Cat No 7.

D G Infield, **Wind/Diesel System with Flywheel Storage**; Presented at the Joint UK/Yugoslav Wind Energy Workshop, National Engineering Laboratory, ERU-89-002, Cat No 14.

1990

G H Smith, I Grant, A Lui & D G Infield, **Diagnostics of Offshore Wind-Turbine Aerodynamics by Particle Image Velocimetry**; Proceedings of the BWEA 12, MEP, London, Cat No 4.

D G Infield, P Lundsager, J T G Pierik, V A P Van Dijk, M Falchetta, O Skarstein & P D Lund, **Wind/Diesel System Modelling and Design**; Proceedings of the EWEC '90, H S Stephens & Assoc, Madrid, Cat No 4.

D G Infield, **Storage and Logistics Ch 16 in 'Wind Energy Conversion Systems'**; Ed Freris L L, Prentice Hall, Cat No 7.

D G Infield, **An Assessment of Flywheel Energy Storage as Applied to Wind Diesel Systems**; Wind Engineering, Vol 14, No 2, Cat No 11.

D G Infield, **IEA Expert Group on Decentralised Applications of Wind Energy**; Wind-Diesel Guidebook, Siting and Implementation, NEL, Cat No 14.

D G Infield, **Investigation of a Wind/Diesel System with Flywheel Energy Storage**; Proceedings of Workshop on Wind Integration into Medium and Small Diesel-Electric Grids, Ed Forster J E, RAL, Cat No 5.

1991

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RESEARCH GRANTS COMPLETED SINCE 2000 and CURRENTLY FUNDED RESEARCH

1. A JOULE project to design and evaluate large-scale systems for wind powered desalination. Led by the Institute Tecnológico de Canarias, with CIEMAT (Spain), NEL (UK), and Enercon (Germany) - CI
(Completed 2000) € 100,000
2. A JOULE project on the design and performance of multi-functional facades, including PV and solar thermal collectors. Co-ordinated by CREST, with HfT Stuttgart and Grammer GmbH of Germany, and TFM of Spain - PI
(Completed 2000) € 119,250
3. A JOULE project to develop an expert system to integrate renewable energy sources in the European supply system. Co-ordinated by CIRPS (Italy) with SYSIN of Italy, IST of Portugal, LCE of France and ISES of Italy - CI
(Completed 2000) € 124,388
4. An EPSRC project to design and build a solar simulator, funded by CREST and developed in conjunction with the Civil and Building Engineering Department of Loughborough University - PI
(Completed 2002) £ 80,000
5. An EPSRC project on maximum power point tracking design and assessment, with emphasis on thin film cells - PI
(Completed 2001) £ 109,683
6. A THERMIE project to install and monitor an architecturally-integrated grid-connected PV roof for the Centre for Renewable Energy Education and Demonstration at Delabole. Co-ordinated by BP Solarex Ltd, with several others - CI
(Completed 2002) € 14,713
7. An ETSU project (with DTI funding) to develop a small-scale high-performance PV-powered reverse osmosis system, working with Dulas Ltd of Machynlleth - CI
(Completed 2001) £ 89,240
8. An ALTENER project to develop a European Master's degree in renewable energy, led by EUREC of Brussels with a number of others - CI
(Completed 2001) € 12,000
9. An ETSU project (with DTI funding) for extended monitoring of the PV roof for the Centre for Renewable Energy Education and Demonstration at Delabole - PI
(Completed 2002) £ 62,042
10. A Teaching Company Scheme with Marlec Engineering Co Ltd, to develop and bring into production a small wind turbine with a novel self-pitching rotor - PI
(Completed 2002) £ 71,000
11. An ALTENER project to develop a planning tool for small-scale embedded wind generation, led by Shropshire County Council with Vergnet (France) - CI
(Completed 2001) € 31,125
12. A JOULE project to study the adsorption cooling of buildings with integrated PV/solar air heating façades, led by HfT Stuttgart - PI
(Completed 2002) € 93,500

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| 13. | A JOULE project to develop a high-efficiency energy converter for grid-connected PV, led by SEI of Italy, with ATERSA of Spain and the Slovak University of Technology - CI
(Completed 2002) | € 56,271 |
| 14. | A feasibility study to assess the renewable energy resources on the Taslica peninsula in Turkey - PI
(Completed 2001) | £ 33,300 |
| 15. | Participation in a thematic network on energy in the built environment, co-ordinated by University College Dublin - CI
(Completed 2003) | € 6,000 |
| 16. | A project funded by the British Council to promote the use of photovoltaics in Cuba - PI
(Completed 2003) | £ 4,400 |
| 17. | A link programme funded by the British Council to research the application of low-cost RE systems in rural areas of Bangladesh - PI
(Completed 2004) | £ 5,000 |
| 18. | An EPSRC project to characterise and model the performance of amorphous-silicon arrays for BIPV systems - PI
(Completed 2004) | £ 192,197 |
| 19. | An EPSRC project to develop a Master's training course in renewable energy systems technology - CI
(Completed 2004) | £ 371,257 |
| 20. | An EPSRC project to study the impacts of and limits to widescale embedded generation from micro-chps and photovoltaics - PI
(Completed 2004) | £ 130,358 |
| 21. | An EPSRC project to develop an electrical energy supply and demand tool for the urban environment (The Solar City) - PI
(Completed 2005) | £ 201,911 |
| 22. | A Faraday Partnership project for the integration of new and renewable energy in buildings - CI
(Completed 2006) | £ 75,000 |
| 23. | A project funded by the Small Business Service to study the feasibility of a small low-cost wind turbine unit - PI
(Completed 2007) | £ 19,305 |
| 24. | An EU CRAFT project to develop a novel battery for solar systems - CI
(Completed 2006) | € 49,600 |
| 26. | An EU-funded project to validate and improve PV measurement technology and modelling approaches - CI
(Completed 2008) | € 179,620 |
| 27. | An EPSRC SUPERGEN (HDPS) project to study highly distributed power systems – Consortium PI
(Completed 2010) | £ 3,400,000 |
| 28. | Participation in UKERC future sources of energy (PV theme leader)
(Completed 2008) | £ 179,449 |
| 29. | A Marie Curie project to develop an integrated urban management tool (CITYNET) - CI
(Completed 2010) | € 203,694 |

30.	An EPSRC SUPERGEN project to improve the reliability and availability of wind turbines - CI (Completed 2010)	£ 265,041
31.	EPSRC Platform Grant on the integration of renewable energy generation – CI/PI (Started 2008)	£785,000
32.	EPSRC Transition pathways to a low carbon economy – CI (Completed 2011)	£175,000
33.	EPSRC UK-China Joint Research Consortium on Sustainable Electric Power Supply – CI (Started 2008)	£180,000
34.	EPSRC Feasibility Study of the Potential for Electric Vehicle Batteries to be Used for Network Support – CI (Completed)	£120,000
35.	EPSRC SUPERGEN: Delivery of Sustainable Hydrogen – CI (Started 2007)	£200,000
36.	Doctoral Training Centre in Wind Energy Systems – CI (Manager of DTC) (Started 2009)	£6,400,000
37.	ETI/EPSRC NOVA project – CI (Completed)	
38.	ETI/EPSRC HELMWIND project – CI (Completed)	
39.	ETI/ESRC FLOW project on wind turbine condition monitoring – CI (Started 2009)	£330,000
40.	An EPSRC SUPERGEN (HiDEF) continuation project to study highly distributed energy resources – Consortium PI (Started 2010)	£ 4,254,000
41.	EPSRC Stability and Performance of Photovoltaics (STAPP) – CI (Started 2011)	£140,000
42.	EPSRC Transformation of the Top and Tail of Energy Networks – CI (Started 2011)	£3,912,000 (consortium total)
43.	EPSRC Transition pathways to a low carbon economy (Phase 2) – CI (Started 2011)	£190,000
44.	Funding from Scottish Power Renewables (Iberdrola) for a first assessment of wind asset management through wind farm data analysis - PI (Completed 2013)	£40,000
45.	Funding from Scottish Power Renewables (Iberdrola) for a second assessment of wind asset management through wind farm data analysis and condition monitoring - CI (To start 2013)	£100,000

- 46. Funding from SSE and Scottish Power Renewables (Iberdrola) for an assessment of the potential for inertial response from wind turbines and the impact on power system stability - CI
(To start 2013) £150,000
- 47. EDF studentship on offshore wind turbine condition monitoring – Supervisor
(Started 2011) £90,000

Two proposals are presently under consideration by EPSRC and NFRC of China for collaborative research under the heading of Smart Grids on the use of electric vehicles to provide power network services. Plus a further EPSRC proposal on network services from wind.