ETP’s Membership

ETP is the Scottish Academic Research Pool in energy, an autonomous alliance of 13 independent Scottish HEIs, each with areas of outstanding research capability in the energy sector.

It creates value for the Scottish economy by acting as a broker between academia and external organisations and industry, promoting and disseminating ETP’s mission to translate excellent research into economic impact.

Foreword

As Chair of the Energy Technology Partnership (ETP), and on behalf of my fellow ETP Board members, I am delighted to write this foreword to the 2018/2019 Annual Report.

This year has been a particularly dynamic and successful one for ETP, as we build on the core principles of academic excellence through collaboration, widening the impact of research and providing industry with highly talented, research-trained, leaders of the future. Each of our 13 member universities has specific strengths in energy-related research, but by pooling capabilities across ETP we achieve much more. In supporting SE, HIE and SDI through their inward and outward missions, it is clear that the ETP model is one which is envied across the globe.

We are celebrating, the successful continuation of two of our key programmes; not least, our flagship Energy Industry Doctorate Programme which has now supported 114 PhD students across all 11 of our energy themes, driven by strong industry engagement, and the demand for industry-ready researchers. We are grateful to the Scottish Government for its continued support of this programme.

Additionally, our innovation exchange programme, the Knowledge Exchange Network (KEN), has now moved into Phase 3, funded by the Scottish Government, SE and HIE. Phases 1 and 2 supported over 600 low-carbon SMEs, completing 173 innovation projects between academia and industry, and delivering added jobs and investment, and helping meet carbon reduction targets.

ETP’s success could not have been achieved without the continued support of our many partners, from the partner universities, the energy and power industries, Government, public sector agencies and a variety of other organisations. You will find more detail in this Annual Report, which highlights case studies of how Scottish industry has benefited directly from ETP’s capability. We are indebted to the support of our funders and other key stakeholders and I would like to take this opportunity to thank them for the role they play in facilitating ETP to deliver significant research and innovation led technological and economic impact. I would also like to thank our ETP Advisory Board, chaired by Prof David Sigsworth, which continues to provide invaluable feedback and guidance.

Professor Sir Jim McDonald
Chair of ETP
“The recent review of the scope of ETP’s activities has ensured the programme meets the increasing need for innovation to achieve decarbonisation goals as well as ensuring social issues are fully considered. ETP’s doctoral programme is widely recognised by sponsoring industrial partners for its relevance to their business as well as for its academic quality. This is reinforced by the wide collaboration between ETP’s participating Higher Education Institutions and Innovation Centres involved in energy research throughout Scotland.”

Professor David Sigsworth OBE, Chair of the ETP Advisory Board

Research Excellence into Economic Impact

Our Vision is to build on the existing areas of excellence and collaborative working to make Scotland a world renowned source for energy related Research, Development & Demonstration (RD&D) and its commercialisation.

We contribute to a Scottish World-Leading Research Base that is internationally competitive and strengthening its global reputation and standing.

- **200 Academics and 700 Researchers Across Scotland**
- **£4.38M Value of all Research Activity to Date**
- PECRE Exchanges with Research Institutions in 8 Countries Around the World
- PhD Industrial Sponsors from 13 Countries Across the Globe

We support the energy sector with the Skills it needs, primarily through PhD programmes.

- **114 PhDs Funded**
- **39 PECRE Foreign Research Exchanges Completed**
- **67 PhD Graduates into Industry or Academia**

We create Economic Impact for the Scottish economy and society through communication, special interest groups and knowledge exchange activity.

- **528 New Jobs for SMES**
- **171 Innovative New Products or Processes Developed**
- **£122.7M Projected Increase in SME Turnover**
- **£8.7M Value of Wider Impact for SMES Following ETP Support**
The ETP Energy Industry Doctorate Programme addresses the strategic demands of industry and government for ‘industry-ready’, post-doctoral researchers to enhance energy industry innovation and knowledge exchange (KE) effectiveness. A defining characteristic of the programme is strong industry engagement where companies are co-investors, support project specification and engage with the research directly.

The programme has been running since 2010 and 114 high quality PhD studentships are now underway or have graduated. Seven new projects have just been approved in 2019, and funding for a further six studentships will be available in 2020. To date there are over 60 students who have graduated from the programme.

Eligible projects can focus on specific energy technologies such as tidal energy or biomass, and cross-cutting themes such as energy economics, policy, law & environment, energy systems, and materials.

Energy Industry Doctorates

“The Scottish Government continues to support the Energy Technology Partnership. The ETP plays an important role in facilitating collaboration between academia and industry and so ensures that research both has relevance and impact. This becomes ever more important as we recognise and face the challenge of the Global Climate Emergency and the enormous changes that it will require for our energy systems.”

Kersti Berge, Director of Energy and Climate Change, Scottish Government

Industrial Sponsors

67 PHD GRADUATES

£2.8M MATCHED FUNDING FROM INDUSTRY
PhD Case Studies

Innovative use of Geothermal Piles as heat storage to enhance Embankment Performance (IGPEP)
University of Dundee, University of Glasgow and Scottish Road Research Board (SRRB), Transport Scotland

The project has created significant academic impacts through three inventions that have advanced the physical modelling capabilities in the research field.

The project also made the first attempt, as far as the research is aware, to transfer the technology of thermo-active pile row for slope application, and innovatively use this system to extract shallow geothermal energy for road surface de-icing. The new technology and findings have expanded the capability of the sponsor to service their transport assets in extreme winter weather conditions.

ETP initial support in providing funding to the project has been really appreciated; without it the centrifuge modelling phase would have been impossible.

ETP, mainly through its annual conferences, provided valid opportunities for meeting and for sharing ideas with students from different academic backgrounds.

Dr Davide Vitali- PhD Graduate, University of Dundee

The fund provided by ETP (and also the sponsor) has created a number of new and advanced technological development in relation to the research on the performance of thermo-active geo-structures and their interaction with the surrounding soil, from geotechnical perspectives.

The fund has trained a competent student, who is expert in analysing the engineering behaviour of thermo-active energy and application in renewables. The student is now a graduate engineer, transferring the knowledge created in his PhD in practice.

Dr Anthony Leung, Honorary Research Fellow/Assistant Professor, University of Dundee/Hong Kong University of Science and Technology (HKUST)

Optimisation of a Ship Wind-Assisted Propulsion System
University of Glasgow, University of Strathclyde and SMAR Azure Ltd

The project aims to impact on the marine engineering industry on the economy and the need to develop innovative, cost-efficient products to maintain a competitive advantage and develop the associated supply chain. The SWAP development project is well matched to the majority of key themes (innovation through R&D; operational excellence; skills development through high skilled employment of engineers, technicians, support staff; internationalisation due to the global nature of the shipping industry; supply chain development due to the large number of components and labour required for SWAP manufacturing. The strategies also aim to help the Scottish and UK industry shift towards a low carbon economy by delivering “clean growth”.

Communication with SMAR Azure has increased as the project has progressed and their input has been extremely useful in guiding and helping with the research. Managing the different timescales and deadlines of industry and academic work has been a challenge but at present the work has reached a nice balance between shorter term industry led deliverables and longer term academic requirements.

James Cairns, PhD Student, University of Glasgow

High precision fault localisation in buried power cables based on wireless charging
Glasgow Caledonian University, Edinburgh University and Scottish Power Energy Networks

The main impact of this project is intended to reduce the man-hour costs due to wide area excavations, to reduce prolonged downtimes to meet maximum supply cut commitments to customers, and reduce extended traffic disruptions due to roadworks. Thereby saving time, reducing cost, improving security of supply, and mitigating the negative societal impacts.

The last 7 months have been a period of intense learning and development. I’m confident that I have not only gained a great deal of new knowledge but have also developed my ability and confidence to carry out research in a professional manner. I have dived deep into understanding scientific concepts and seen theory become illustrated through software simulations.

Andrew McDiarmid, Project Engineer (Future Networks), Scottish Power Energy Networks

Scotland is moving to become a low carbon nation and the brilliance of our universities is needed more than ever to overcome the challenges, and realise the opportunities, that different forms of energy production, distribution and use will bring. ETP brings the best minds to the task, in collaboration, and SFC is delighted to support it...”
Stuart Fancey, Director of Research and Innovation, Scottish Funding Council

My supervisors have provided me with a wealth of support that has been a torch of guidance in a dark room of confusion. Their support has made the experience enjoyable so far and their show of expertise in their field of study has strengthened the ambition in me to strive to become an expert in my field.

Khalif Ali - PhD Student, Glasgow Caledonian

We have now held multiple meetings for this project, with the kickoff meeting in February, and a follow-up meeting in July. Khalif presented on the project at both of these occasions, and we are satisfied that the project work plan will be met. We are also satisfied that Khalif has developed a good understanding of the challenges we face, and has built a good knowledge base in order to meet the challenges of this project.

Andrew McDiarmid, Project Engineer (Future Networks), Scottish Power Energy Networks

James has become a valuable resource for the company, has delivered well in all tasks discussed. The outputs of his work have influenced the development of our wider project.

Dr Sabrina Malpede, CEO, SMAR Azure Ltd
Theme Activity

Wind Energy
► The Wind Energy Theme Group held a workshop in June 2019, which brought senior academics from a large proportion of ETP member universities together to discuss the challenge of integrating very high levels of wind energy onto the electricity grid. Attendees engaged with technical presentations from several academics on ongoing research, opportunities to fund collaborative research between the universities, and a discussion about synergies that could be exploited in large collaborative projects. This workshop has led to further discussions about potential Strength in Places projects with an energy focus between ETP partner universities.
► The wind theme has co-hosted three events with Scottish Enterprise, aiming to educate attendees about specific areas of the wind industry: Foundations (Jun ’18), Robotics (Jun ’18) and Blades (Oct ’18). The events are an opportunity to hear directly from wind farm developers and the opportunities they hold for innovation, from SMEs actively developing new products and services and from support providers (SE, ETP, OREC, Carbon Trust etc.) about what help is available.

Energy Efficiency in Buildings (EEB)
► In June 2019 the Business Development Managers for Energy Efficiency in Buildings and Marine Energy organised theme engagement events on the Isle of Lewis. This series of cross-theme engagement events led the ETP to hold a mini-KEN and information session at the Lews Castle College, University of Highlands & Islands campus to discuss future collaboration and funding opportunities. Additionally the BDMs held a series of one to one meetings with local SME’s from within the Marine, Wind, Energy Systems & EEB themes, with the trip culminating in the ETP hosting an information session at the Stornoway Highlands & Islands Enterprise (HIE) offices with the HIE, Business Gateway & Wave Energy Scotland teams.
► 27th March 2019 saw the Impact Acceleration Account ‘Impact Festival’ take place which was organised by 5 Scottish universities who have been awarded an EPSRC Impact Acceleration Account (IAA) which was designed for early and mid-career academics and researchers. The Impact Festival focussed on engagement with external partners to expand collaborative working, leading to impact between researchers, academics, industry, charities and Government. Within this event Laura Finlay (EEB BDM) gave several presentations throughout the day about the future research funding landscape, opportunities for collaboration across universities and with industry, and how to maximise research impact.
► On 18th June 2019 ETP jointly hosted with ABB ‘Innovative Future Technologies: Overcoming the challenges and meeting the targets at the Edinburgh Centre for Carbon Innovation (ECCI). The event examined the pathways towards delivering future energy systems in support of the route towards energy decarbonisation in Scotland and the rest of the UK. Speakers from across industry and academia examined what the future may look like and which technologies can be used and offered potential solutions towards delivery of Scottish & UK government targets. Approximately 45 delegates attended from across industry, academia and the public sector.

Energy Policy, People, & Society (EPPS)
► Net-Zero Challenge Forum - The EPPS Theme Group is setting up a Net-Zero Challenge Forum, in partnership with Ofgem, the Scottish Government and the Energy Systems Catapult, amongst others. This multi-disciplinary and cross-sectoral forum will address the problem of how to actually achieve the energy transition, given that the greatest challenges are often societal and economic.
► EPPS Theme Group, in collaboration with Energy Systems Catapult, has been supporting Scottish Enterprise with a series of Funding Brokerage and Support Workshops (in TIC, Glasgow) about current and upcoming funding calls from Innovate UK and ERA-Net Smart Energy Systems, in July, October and November 2019. Industry and SME’s provided overviews of areas of interest and partnering requirements. The innovation support team help to identify opportunities for consortia-building and bid development support.

Solar PV
► ETP and the Solar Trade Association co-hosted “Setting Sights on Scottish Solar” Conference on 2nd September 2019 in Edinburgh, where stakeholders across the solar value chain discussed and debated cutting-edge industry developments.
► ETP is undertaking a review of the solar opportunity in Scotland. A report will be published at All-Energy 2020.
The annual one-day joint Energy Conversion & Storage event took place on 7th June 2019 in St Andrews, with this year’s theme being Energy Storage & Innovation: Delivering a Clean Transition in Scotland and was supported by Scotland’s Centre for Innovation and Energy Storage (CIES), ETP and the Scottish Hydrogen and Fuel Association (SHFCA). With the Scottish Government’s Energy Strategy ‘The Future of Energy in Scotland’ identifying the importance of using a whole system energy approach, the event’s programme presented the progress being made both by academia and industry to support key policy ambitions, with topics ranging from hydrogen storage at large scale to innovative conversions using hydrogen as decarbonised energy and as a feedstock.

ETP was a co-supporter for the Centre for Innovation in Energy Storage’s event Waste to Wealth: Opportunities in the Circular Economy along with Zero Waste Scotland, ScotCHEM and IBioIC which took place in St Andrews in June 2019. The event brought together academia and industry to address one of the world’s most important technology challenges; the efficient storage of renewable energy and also offered the opportunity to discuss how recycling and resource recovery can help Scotland meet its energy targets.

On 13th May 2019 ETP went on their first ever farm visit to Cononsyth Farm in Arbroath where the Dowell family showcased the renewables that are generating energy on their farm. Renewable energy has made a transformational difference to the working conditions of the farm with advantages such as prolonged life of harvested crop, thanks to an ETP funded project with Edinburgh Napier University. The University of Dundee then hosted a stakeholder discussion at the Botanic Gardens and provided a tour and overview of the University’s Ecohouse.

Heat Energy
- Heat Energy Theme Co-ordinator, Zhibin Yu, was promoted from Senior Lecturer to Professor of Thermal Energy at the University of Glasgow.
- Professor Yu’s research mainly focuses on thermal energy technologies and their fundamental thermodynamic, heat transfer, fluid-dynamic problems. He is also supervising a PhD Student, Si Chen, at the University of Glasgow who is funded by ETP’s Energy Industry Doctorate Programme. Chen’s research which is looking at integrated urban energy systems for heating and power is sponsored by an industrial partner, Scottish Power Energy Networks.

Bioenergy
- The ETP Bioenergy Theme hosted a workshop “Progressing Bioenergy in Scotland” on 8th March 2019 at University of Glasgow. The event discussed the Scottish Government 2018 Energy Strategy and the ambition to develop a bioenergy action plan for Scotland that will provide the next steps required to achieve the 2050 vision for energy in Scotland.

Marine Energy
- ETP and Heriot-Watt University co-delivered a workshop which explored decarbonising marine energy systems on 22nd July 2019 at the Edinburgh Centre for Carbon Innovation. This joint event aimed to demystify the use of combinations of new technologies, industrial opportunities and business models to deliver a low carbon Blue Economy.
- On 25th January 2019, ETP held a consortia building workshop for the OCEANERA-NET COFUND in Glasgow which aimed to coordinate support for research and development in ocean energy, to encourage collaborative transnational projects that tackle some of the key challenges identified for the sector as it progresses towards commercialisation. The ETP Team provided an opportunity for Q&A’s, clarification on funding requirements and the application process.

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New in 2018/2019 – Phase 3

For 8 years, the Energy Technology Partnership has successfully managed Phases 1 and 2 of the Knowledge Exchange Network (KEN), a £9M programme which helps Scottish universities increase the impact of their research, and the Scottish Governments meet its goal to make the SME sector more research intensive. Phase 2 ended on 31st March 2019 and segued seamlessly into Phase 3, which started on 1st April 2019. KEN III, a 3-year programme worth £4M, will continue to build on established industrial and academic links. Funded through the ESIF, Scottish Government, Scottish Enterprise, Highlands & Islands Enterprise, Wave Energy Scotland, the Offshore Renewable Energy Catapult, the Energy Systems Catapult, the Scottish Funding Council, and substantial support from our partner universities, a dedicated team of 7 sector-specific Business Development Managers (BDMs) increases innovation and advances the development of the low carbon economy in Scotland.

Successful Partnerships

This programme has engaged with over 630 Scottish SMEs over the 8-year period, providing funding and support between the SMEs and academics from the 13 partner Scottish Universities. In working closely with these SMEs we have identified, brokered, and managed 173 Industry Engagement Fund projects that build the overall capability of the low carbon and renewable energy sector.

Now with closer links to innovation centres and catapults, ETP can help you to access the entire funding escalator, from the £5k SFC innovation voucher, through SMART and R&D grants, to EU and UKR&I calls.
Knowledge Exchange Case Studies

ETP has connected SME’s in Scotland with academic institutions to develop low carbon technology, over the past year we have brokered the following collaborations.

University of Strathclyde and Windswept & Interesting Ltd (W&I)

Windswept & Interesting and University of Strathclyde jointly received a £5k Innovation Voucher followed by £15k of ETP KEN project support. The ETP funding enabled W&I to realise breakthrough performance on their kite turbine generation systems.

The collaboration with University of Strathclyde, set up by ETP, helped them to gather and interpret highly reliable test data. This new understanding of their systems ability enabled development of protected IP on top of their open IP framework. Through the course of testing, tweaks and redesigns, this lead to much higher performance flying rigs and generation of better control architectures. “We can now predict power scalability in our systems far exceeding competitive designs. We are also now able to work on a range of larger model developments, which will open doors for investment. The process attracted further academic attention and two new interns will be working with the company from EUREC affiliated universities this term.” - Roderick Read, Director W&I

Heriot-Watt University and IES

During the summer of 2018, HWU student Melanie Gines, successfully ran a joint project between Integrated Environmental Solutions and Heriot-Watt University to analyse the implications and value of the calibration process of building energy models (BEMs). The project was facilitated and funded by a £3.5k award under the ETP’s Student Engagement Project (STEP) scheme.

Melanie embarked on the project following advice from her Lecturer, who recognised that such a project would allow Melanie to further develop her research skills and commercial experience, and bring value to the organisations involved, as well as positively boosting her career prospects.

Alex Maclaren, Associate Professor of Architecture & Senior Director of Studies for Architectural Engineering stated that ‘The research provides a valuable contribution to our understanding of model calibration. This remains an essential part of our understanding of modelling energy use in buildings, and our efforts to close the ‘performance gap’. The ETP-funded research project has achieved the stated aims of the project and also effectively catalysed a growing relationship between the Industry and University partners. The student has worked extremely effectively and the quality of the work is to be congratulated.”

Whilst IES’ Head of Research for Europe, Valeria Ferrando said, “The research carried out during the project will have a very positive impact for IES as it will allow us to optimise the existing calibration procedure of the company and implement as part of our consultancy services worldwide, minimising internal costs. It will also improve the existing software used for the calibration process for increased productivity and allow us to expand our consultancy services to larger projects around the world.”

Another benefit is that, as a result of this collaboration, is IES has been in discussion with HWU about helping the University manage its global portfolio of buildings as well as using the IES software in a “living lab” for students.

University of the Highlands & Islands and Greenspace Live Ltd

Greenspace Live became the first spin-out company from the University of the Highland and Islands in April 2012. The company is a recognised global leader in energy modelling and simulation and provides powerful software solutions to complex energy problems.

Greenspace won an £8.5k KEN11 funding award to have UHJ work on a new laser scanning tool to construct models/dynamic simulations for use in the non-domestic sector. An internet centric and low-cost approach will be key to greater uptake of such tools as the progress towards deep renovation accelerates.

The company was then awarded a further £3.4k from the ETP Student Engagement Project fund to allow UHI students to work with the new system on a range of building applications gaining real world experience to add to their research activities.
“We want the Highlands and Islands to continue to be a highly successful, inclusive and prosperous region in which increasing numbers of people choose to live, work, study and invest. Key to that is a diverse and thriving energy and low carbon sector, which given ambitious energy transition targets, requires increased levels of research and innovation. The ETP is a hugely valuable alliance, and the KEN is enabling academia and our business base to work together to translate exceptional research into economic impact.”

Audrey Maciver, Highlands & Islands Enterprise

KEN Case Studies

University of St Andrews and RIGOCAL Engineering Ltd

RIGOCAL Engineering Ltd were supported with a £10k grant through the KEN11 Engagement Fund to work with the Sea Mammal Research Unit (SMRU) at the University of St Andrews. The funding supported a collaborative research project between the university and the company partners to evaluate a new innovative, cost-effective solution for marine wildlife protection during offshore human activities related the Energy Sector.

“Thanks to the support from ETP and its connection with universities, we have made a lot of progress in such a short period. ORE Catapult also provided a great networking platform during a workshop on technology challenges faced by the offshore renewable industry, hosted by the organisation and NSRI in Aberdeen. The system proposed by RIGOCAL generated interest among the workshop participants. The output of the research has brought to RIGOCAL a further collaboration with another Scottish University and a research centre to develop a prototype of the system. With this R&D background of collaboration with the Universities, RIGOCAL has been selected for Elevator’s Accelerator Cohort 7 in Aberdeen to strengthen our business capabilities.” - Dr Alessandro Bedin, Managing Director, RIGOCAL Engineering

University of Strathclyde and Gravitricity

Gravitricity were awarded a £9.8K grant by ETP for a project with the Power Networks Demonstration Centre (PNDC) at the University of Strathclyde. This gave the company access to a unique blend of R & D expertise encompassing how energy storage can be rapidly dispatched and the implications of grid compliance and an understanding of grid-connected multi-motor systems – a perfect fit for the company’s requirements.

Following successful delivery of the ETP project, the company was awarded £650,000 of funding from Innovate UK’s Infrastructure Systems Innovation competition “Clean & Cool Mission”. Gravitricity’s first-of-a-kind 4MW prototype system will be cheaper than batteries on a levelised cost of storage basis. The modelling emphasizes the importance of long life and lack of degradation for revenue stacking.

KEN - Impact

In KEN III we have started gathering evidence of the wider funding impact. To date, ETP has recorded £8.7M of follow-on funding which has been secured from IUK Grants by companies that have completed ETP projects.

Orkney distillery achieves a world first by creating hydrogen-powered gin distilling

During KEN 2, Orkney Distilling Ltd and Edinburgh Napier University carried out a project through the KEN Engagement Fund which was followed by the company and the university, along with the European Marine Energy Centre (EMEC), successfully applying for £150,000 through the Phase 2 of the Industrial Fuel Switching Competition. This enabled the creation of the ‘HySpirits’ project, which aims to provide environmentally friendly heat during distillation and will result in making their industrial process cleaner by lowering emissions.

ETP supporting SMEs to access funding through Energy Systems Catapult’s Innovator Support Platform

The Innovator Support Platform (ISP) offers SMEs advanced energy system expertise, from across the Energy Systems Catapult, to receive tailored business incubation and acceleration support. The ISP aims is to help innovators unlock new routes-to-market, secure investment and breakdown barriers to growth – with two innovator challenges announced each year.

The second Innovator Challenge was aimed at heating & cooling SMEs while the third innovator challenge was aimed at digital and data SMEs developing innovations to support the emergence of a flexible energy system marketplace and increase adoption of low carbon technology by leveraging data from networks and end users to create new market models. ETP heavily promoted and targeted companies in our network to apply for these calls and supported them throughout the application process. Several ETP supported companies, including iPower Energy Ltd and Sunamp Ltd, were successful in both calls.

Not for profit company able to use new heat resource in Aberdeenshire discovered by Glasgow University to meet local demand

ETP supported not for profit, Aberdeen Heat and Power, to set up a research group to explore whether deep geothermal energy could provide a significant supply of heat to Aberdeen’s growing district heating network. The results of their project found significant potential in the Aberdeenshire area.

“A BDM [from ETP] supported us to host a workshop in Aberdeen to disseminate the results of the project with stakeholders. By providing a scientific platform for geothermal resources in Aberdeenshire, the ETP project provided the foundation to form a consortium, which successfully won funding from the LCITP-Geothermal Energy Challenge Fund. Without the ETP project funding, we would not have had the scientific results or..."
ETP helps SDC achieve success with being awarded £8.5k funding with University of Strathclyde PEDEC Group

SDC successfully applied to ETP for grant funding to work with University of Strathclyde on its innovative Voltage Optimisation product which needed further development. The Power Electronics, Drives and Energy Conversion Group (PEDEC) successfully conducted a short project that proved the viability of the product and how it could be further enhanced.

The early work proved to be very successful and has led to SDC preparing a Knowledge Transfer Partnership (KTP) application with the Strathclyde University research team to progress product innovation further.

“After the original engineer was unable to undertake the further development, by good-fortune and timing, we engaged with ETP to carry out a theoretical evaluation of what we wanted to achieve as far as design and specification of the new fully automatic Voltage Optimisation unit (what we had termed Ultra 2). ETP introduced us to the PEDEC Research Group at Strathclyde. Through discussions and meetings with all parties that process was very successful and the final report confirmed to us that we could see a way forward for development of our product.”

Following the success of the ETP funded project, we are now in the final stages of putting a joint proposal through the Knowledge Transfer Partnership (again introduced through ETP) for further funding, which will allow us to work with Strathclyde to take this product to reality and at a point we can release it to marketplace.” – David Sullivan, Managing Director, SDC Industries

£20k ETP grant awarded to University of Edinburgh’s FloWave and Nova Innovation, leads to flagship €20 million European tidal energy project

Scotland-based tidal energy leader Nova Innovation has won a European tidal energy project, heading a consortium of nine leading industrial, academic and research organisations from across Europe. The Enabling Future Arrays in Tidal (EnFAIT) project builds on Nova’s existing operational tidal power station in Bluenull Sound off the Shetland Islands in Scotland, which was the world’s first grid connected offshore array of tidal energy turbines.

The project, which began in 2017 and will run until June 2022, has been awarded funding from the European Union’s Horizon 2020 research and innovation programme to develop marine energy sources and demonstrate technologies in European waters. The project is a flagship initiative for the EU and marine energy, and aims to increase the commercial viability of tidal power. Total project costs are expected to be €20.2 million, to which the EU Horizon 2020 Programme will be contributing €14.9 million.

New streamlined funding and brokerage service from ETP with co-ordination, enhanced support at its heart

ETP has recently developed a co-ordinated Funding Brokerage Support Service in collaboration with Highlands & Islands Enterprise and Scottish Enterprise (including Scottish European Green Energy Centre and Enterprise Europe Network). By working in collaboration with ETP’s funding partners and across all the ETP Energy Themes, we provide an impartial call-scoping and consortia-development role for upcoming and current funding calls.

At the most basic level, ETP highlights opportunities for funding and brokerage to its networks. With its impartial role, ETP can support shaping and scoping of project ideas and help identify strong consortia partners.

This approach had provided notable success for Perth & Kinross Council to access funding from the Can Do Innovation Challenge Fund Call. Four of the winning £30k Stage 1 Design consortia consisted of Scottish SME participants which ETP has supported. The two £100k Stage 2 Implementation Project winners were also awarded to ETP-supported Scottish SME-led bid partners.

ETP has also been involved in providing European consortia development and bid development support for the winning consortia of the £2.5M Smart Integrated Energy System Project (SIES2022). Lead partners from the Scottish consortia were Revolution Energy (Scotland) Ltd., the Energy Technology Centre and the University of Strathclyde.
Internationalisation

**PECRE: Post Graduate and Early Career Researcher Exchanges**

The SFC PECRE scheme provides research training and development opportunities for the most able postgraduates and early career researchers working within the Scottish research pools, while at the same time building experience of international collaboration with academia and industry. The fund supports researchers to participate in exchanges with companies or academic institutions in Europe, North America, China and India.

To date, ETP has awarded 39 grants since 2016 to existing PhD students and Early Career Researchers across ETP’s member universities. The projects included exchanges with the USA, Spain, Belgium, Denmark, Switzerland, Italy, France, China, Germany, Norway, Finland, India and Canada, on subjects ranging from solid adsorbents for CCS, to demand-side management and network simulations.

**Bismuth absorbers in triple mesoscopic solar cells at Wuhan National Lab for Optoelectronics, China**

From this exchange experience, I achieved a lot in many aspects. 6 weeks is quite a short period for a complete academic research study. Therefore, a well-planeted schedule is necessary. The first thing I learned is how to schedule and manage time properly. Learning time management skills will help me work more efficiently in both research and daily life. Another thing I learned from this experience is being patient. Roma wasn’t built in a day, and neither was a successful experiment. I used to rush forward, but then realised that obtaining the best results is based on quality rather than quantity.

Working with talented researchers in China was pleasant. Under their professional supervision, I was able to make fully-printable mesoscopic solar cells with an efficiency up to 13%. Although the results of bismuth-based devices from exchange was far from our expectation, I increased my skills and experience in the fabrication of triple-mesoscopic cells. In the long-term, the skills acquired will enable me to implement high-efficiency triple-mesoscopic cells throughout the rest of my PhD. This will add a powerful extra dimension to my research and the research opportunities open to me. Additionally, as a Chinese national the placement will build my personal connections in China at research level, facilitating a possible future return to China and broadening links in China for the Edinburgh and Strathclyde groups.

Ying Yuan, University of Edinburgh

**Testing the pilot European Commission building LCA reference document (PEF4Buildings) on two case-studies and comparison of the results with the CEN/TC350 standards at VITO/EnergyVille, Mol, Belgium**

This research exchange aimed to test the PEF method on two case-study buildings in Scotland that were studied as part of my ETP PhD project over the last three and a half years. These buildings were designed and built on the Heriot-Watt Campus. Their life cycle has now been modelled using the LCA approach following both the CEN/TC350 and the PEF method. This collaborative research is investigating the potential of the PEF method to be used for benchmarking and for defining performance classes based on building typology. Moreover, it tests the applicability of the PEF method to two new office buildings in Scotland and proposes approaches for the methodological challenges identified in this new context.

It is worth noting that I first became familiar with the PEF method and PEF4Buildings project during my previous ETP PECRE research exchange. In August 2016, I travelled to Amersfoort, the Netherlands, for a research visit at PRé sustainability consultants, who are experts in LCA and presented at the PEF pilot conference as the lead and facilitator of several pilot projects. Last but not least, I would like to extend my sincere gratitude to ETP Scotland for sponsoring this research exchange and awarding me this exceptional opportunity to amplify the impact of my PhD research to a global scale and build a productive network with prime experts of my research field in Europe.

Sahar Mirzaie, Heriot-Watt University

**Biomass Pyrolysis of a Single Particle at the Inorganic Chemistry department, Åbo Akademi University, Turku, Finland**

The main objective of this research exchange was to obtain experimental data in order to validate a single particle model for pyrolysis of biomass. The host institution was chosen because of its laboratory facilities, specially the single particle reactor, and its expertise in the subject of biomass pyrolysis and combustion.

I am very grateful to have had the opportunity to discuss my work with Dr Karlström and Professor Brink, and thanks to Luis, the technician responsible for the lab facilities, I learned how to perform my experiments with the single particle reactor. On top of that, I was invited to attend departmental seminars and to join in social events related to the department. My visit was beneficial for me, because I had the chance to discuss my work with experts from outside my research group, and I had access to lab facilities that my institution do not offer, and I believe that for my host institution, it was also interesting to start using the single particle reactor to measure the mass loss during pyrolysis with satisfactory results.

The experimental data obtained from this research exchange are of great quality for the purpose of model validation, and also show interesting results, which motivate further research considerations.

The university, and specially the departmental colleagues, were all very welcoming, and the accommodation very convenient and comfortable. This experience motivated me to consider further experiments in the line of my research project, which would be interesting to consider in the near future.

Teresa Martí Rossello, University of Strathclyde
"We see the Energy Technology Partnership as an important collaborator in the energy transition - a relationship reinforced by our shared funding of a business development manager for energy systems in Scotland. Through partnership we help accelerate Scotland’s ambition to transform its energy system and ensure businesses and consumers capture the opportunities of clean growth. The ability to bridge the gap between industry, government, academia and research is a crucial component of this ambition. Taking a whole-system view of the energy sector, the collaboration supports Scotland’s determination to identify and address innovation priorities and market barriers, in order to decarbonise the energy system at the lowest cost."

Phillip New – Chief Executive, Energy Systems Catapult

ERA-Net Smart Energy Systems (SES) – European Co-Funding Platform

By involving a broad range of associated partners from innovative start-ups and SMEs to incubators, big companies, ICT providers, deployment programmes and financiers to local governments, ERA-Net SES is an EU Programme which builds bridges in the entire innovation chain and provides projects with valuable resources. Such resources may include expertise, tools, financial resources, or trial sites.

With the associated partners programme, ERA-Net Smart Energy Systems aims to foster the development of technology and business solutions that truly support energy efficiency and energy transition on a local and regional level while complementing and supporting the functionality of the overall energy system. Find more information about the concept and how to get involved here.

During summer 2018, ETP played a significant role in consortia brokerage and bid support for the November 2018 ERA-Net SES Intelligent Energy Systems/ Integrated Regional Energy Systems Co-Fund Call. As a consequence, ETP became an Associated Partner of ERA-Net SES. Associate Partners act as intermediaries to innovation stakeholders. ETP’s support led to the successful funding of the €2.5m ERA-Net SES project; Smart Integrated Energy Systems (SIES2022) in a consortium with Scottish, Spanish, Turkish and German partners. SIES2022 will provide a locally and regionally integrated intelligent energy system, and deliver a Virtual Power Plant and Digital Energy Utility Management Service for over 10 Scottish Local Energy Systems (LES) initiatives or ‘Energy Pools’.

ETP Industry Engagement Funding (approx. £40k) was awarded to SME-academic research collaborations for 4 initial LES modelling projects, which enabled the 4 SMEs to become research partners and energy pool participants in SIES2022. Revolution Energy (Scotland) Ltd. and the Energy Technology Centre Ltd. are the 2 core SME partners in SIES2022, along with University of Strathclyde’s Energy Systems Research Unit. SIES2022 aims to enable regions and local communities to move towards a decarbonised energy system by 2030. SIES2022 will start by the end of 2019 and last 36 months.

Since then, ETP has continued to work in close collaboration with Scottish Enterprise and Highlands and Islands Enterprise to help Scottish companies to access ERA-Net SES, and other European funding, through a range of support activities, such as: brokerage workshops, consortia-development activities, and assistance in proposal scoping. ETP is now developing a streamlined funding brokerage service, in tandem with SE and HIE.

Global Research Dissemination

ETP Students and Early Career Researchers have had the opportunity to present their research at International Conferences

During the EWTEC 2019 Conference, 8-9 September in Naples, Italy, two of ETP’s Alumni presented their research.

ETP PhD Graduate, Anna Garcia-Teruel, University of Edinburgh presented on her research “Towards reliability-based geometry optimization of a point-absorber with PTO reliability objectives”. Anna was also a previous PECRE recipient allowing her to take part in a research exchange with Oregon State University.

Current ETP PhD Student, Mohammed Alaa Almoghayer, Heriot-Watt University presented his research on Tidal Stream Energy Extraction using 3D Numerical Modelling.

PhD Student Si Chen, University of Glasgow, attended and presented her work on Modelling and Optimisation of Integrated Urban Energy Systems for both Heating and Power, at ICAE2019 conference in Sweden.

ETP PhD Graduate, Declan Byrns, presented his research on Redox flow batteries as energy storage systems, at the following conferences;

- Comparative evaluation of open-plan offices with various occupancy number - Sustainability in Energy and Buildings (SEB) 2018 Conference, Australia, June 24-26

PhD Graduate Declan Byrns, presented his research on Redox flow batteries as energy storage systems, at the following conferences;

- International Flow Battery Forum 2019 (Lyon, France)
- International Flow Battery Forum 2017 (Manchester, UK)
- The 231st Electrochemical Society Meeting (New Orleans, USA)
- International Flow Battery Forum 2015 (Glasgow, UK)
- Electrochem 2015 (Durham, UK)

Declan was also a recipient of a PECRE research exchange to EPFL, Switzerland, in 2017.
Annual Conference 2018
ETP hosted its 7th Annual Conference on 29th October 2018 at the Technology & Innovation Centre (TIC) at the University of Strathclyde. The conference was centred around ETP's PhD Students and ECRs. This year ETP invited PhDs from Renewable Engine to also present their research.

The day featured breakout Theme Sessions hosted by the ETP Theme Coordinators and ETP Business Development Managers. These sessions provided an opportunity to engage with other academics and students working in the theme with each session becoming a mini-conference spotlighting the current thrust of research in the Scotland.

Prizes were awarded for the Best Presentation in each theme session and for the PhD Poster Competition, won by Despina Yiakoumi, University of Aberdeen. 2018 also saw the celebration of ETP's 10th anniversary with the Conference Dinner attended by ETP staff and student alumni.

All Energy 2019
During the 15 - 16th May 2019, ETP exhibited in the first ever Research Hub at All-Energy 2019 Conference. This area provided exhibition stands and a presentation theatre for several academic research programmes, including, Renewable Engine, The Bryden Centre, SPIRE 2, ERA, REMIS CDT, GEN Comm and CASE. ETP students presented their research along with the KEN BDMs who presented on the Industry Engagement Fund projects with special guest speakers from two SMEs ETP has supported.

Energy Innovation Emporium 2019
On the 6th June 2019, ETP hosted the 3rd Energy innovation Emporium at the TIC in Glasgow. The Event was attended by 151 people from industry, academia and the public sector and included sessions from SRPe, SUPA, SICSA, MASTS, SAGES, and SULSA. There were presentations from:

► David Richardson (Innovation Lead for Energy Systems, InnovateUK)
► Jim Fleming (Head of Energy Theme, EPSRC)

ETP Energy Nation Road Trip
During the week of 18th-22nd March 2019, ETP hosted a road trip around renewable energy facilities in Scotland. The group of 14 PhD students were from ETP, Wind&Marine CDT, IDCORE and The Bryden Centre were joined by ETP BDMs. The trip aimed to explore how the different facilities can contribute to the realisation of the ambitions of national energy strategies. Sites visited included:

► Steven's Croft biomass plant
► Whitelee Wind Farm
► Power Networks Demonstration Centre (PNDC)
► Cruachan Hydro Power Station
► Smart Fintry Project
► The Levenmouth Demonstration Turbine (OREC)
► Bright Green Hydrogen
► FioWave Ocean Energy Research Facility
► Edinburgh Centre for Carbon Innovation (ECCI);
► Edinburgh College Solar Meadow

PhD Team Building
On 12-13th February 2019 ETP jointly hosted a Team Building Induction with Renewable Engine in Pitlochry. This allowed PhD students from both organisations to network, present their research plans and take part in team activities like quadbiking, forest challenges and salsa dancing.
Contact Us

For further information about working with us, please contact one of our team listed below:

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ETP Structure

Upcoming Events

ETP Annual Conference 2019
14 November 2019, Dundee
The ETP 8th Annual Conference will be demonstrating the research and innovation taking place in the academic sector that is supporting the development of sustainable energy and how Scotland can move towards a low carbon society. PhD students in ETP’s Energy Industry Doctorate Programme and students from similar Low Carbon PhD programmes and early career researchers will be presenting their research on a wide range of fields in energy to academics and industry.

CESI Workshop: Interdisciplinary research for energy systems integration: understanding and promoting good practice
2 December 2019, Glasgow
Co-hosted by CESI (National Centre for Energy Systems Integration), ETP and the Centre for Energy Policy this workshop is aimed at developing best practice guidelines for effective and coherent energy systems integration research in the UK.