



Renewable Energy Northeast Universities

EPSRC Centre for Doctoral Training

Annual Report

1 April 2019 to 31 March 2020



Engineering and
Physical Sciences
Research Council

Contents

1	Director's Foreword	3
2	Introduction	4
3	Aim and Objectives of ReNU	4
4	ReNU Distinctive Attributes	4
5	Governance and Management	4
5.1	Management Committee (MC)	5
5.2	Strategic Advisory Board (SAB)	5
5.3	Delivery Groups (DGs)	5
5.4	ReNU Manager and Academic Support Coordinator	5
5.5	Risk Management and Mitigation	6
5.6	Systems and Tools	6
6	Cohort 1: Doctoral Candidate Recruitment	6
6.1	Principles	6
6.2	Process	6
6.2.1	Marketing	6
6.2.2	Project allocation and selection	6
6.2.3	Outcome and Review	7
7	Equality, Diversity and Inclusivity (EDI)	8
8	Training Programme	8
8.1	Introduction	8
8.2	CDT Week	10
8.3	ReNU Training for Supervisors	10
8.4	Professional Accreditation	11
8.5	Doctoral Candidate Experience	11
9	Partners	11
9.1	NEEM 6	11
9.2	Industry Involvement in Doctoral Projects	12
10	Internationalisation	12
11	Looking Ahead	12
	Appendix 1: ReNU People	14

1 Director's Foreword

I am pleased to introduce the first Annual Report for the EPSRC Centre for Doctoral Training in Renewable Energy Northeast Universities (ReNU).

In 2018, the Engineering and Physical Sciences Research Council (EPSRC) launched a national Centre for Doctoral Training (CDT) exercise. The result of this exercise was an investment of £446m from UK Research and Innovation to create 75 new CDTs including our own EPSRC CDT ReNU.

In putting together a CDT our vision was for an enhanced doctoral training programme delivered by three uniquely co-located major UK universities, Northumbria (UNN), Durham (DU) and Newcastle (NU), addressing clear skills needs in small-to-medium scale renewable energy (RE) and sustainable distributed energy (DE). We were privileged to be supported in this vision by 27 industrial partners and a further 8 partners including Governmental, not-for-profit and key network organisations. In contrast to large-scale centralised generation, the distinctive remit of the ReNU CDT is to support skills for distributed and small-to-medium scale (<50 MW) sustainable energy conversion and storage applications enabled by advanced materials science research and innovations.

The need for an initiative such as our own is essential to underpin the North East Regional Economic Strategy in Energy, the UK national strategy in Clean Growth (one of four UK Grand Challenges) and to support the UN Sustainable Development Goal in Affordable and Clean Energy. ReNU underpins a powerful and growing research partnership between the University of Northumbria at Newcastle (UNN), Newcastle University (NU) and Durham University (DU).

This first year has been a period of intense activity and achievement. I am immensely proud of the partnership working and teamwork across the three Universities and with all of our project partners. Between the informal communication of the award on 20th December 2018, the official EPSRC Centres for Doctoral Training Launch on the 4th February 2019 at the London Stock Exchange and the official start of ReNU on 1st April 2019 the progress of ReNU has been remarkable. This has included building the website and publicity material, signing legal and personal data agreements, creating a functioning governance structure, appointing the Centre Administrator and Manager, preparing the training materials, recruiting a first cohort of 12 high quality doctoral candidates, and welcoming that first cohort to our three Universities and into ReNU itself in October 2019. An overview of key elements of this first year to 31st March 2020 is given in the remainder of this report.

I would like to acknowledge the work of the three Institutional Directors, Dr. Neil Beattie (Northumbria), Dr. Elizabeth Gibson (Newcastle) and Dr. Chris Groves (Durham), and the Universities where each doctoral candidate is formally enrolled as a student and registered for their doctorate. I would also like to acknowledge all co-investigators and the professional support staff who have worked to deliver a quality experience for all our doctoral candidates.

In the year ahead, I look forward to the deepening relationship with our industrial and other partners, work with professional bodies on accreditation, and the embedding of ReNU as a key driver of the both the North East and UK future skills base for affordable and clean energy.

Professor Glen McHale



Principal Investigator and Director of ReNU

2 Introduction

In 2018 the Engineering and Physical Sciences Research Council (EPSRC) launched a national Centre for Doctoral Training (CDT) exercise. The result of this exercise was an investment of £446m from UK Research and Innovation to create 75 new CDTs including the EPSRC Centre for Doctoral Training in [Renewable Energy Northeast Universities](#) (ReNU).

The EPSRC CDT in ReNU formally started in April 2019 and this document provides an overview of progress from the first year of the programme.

3 Aim and Objectives of ReNU

The overall aim of ReNU is to train and equip the next-generation of doctoral graduates with the skills required to drive UK innovation in renewable and sustainable distributed energy applications.

To achieve this aim, the objectives of ReNU are to:

1. create a pipeline of industry-ready doctoral graduates with outstanding problem-solving abilities to enable UK commercial development and exploitation of renewable energy (RE) and sustainable distributed energy (DE) technologies;
2. provide a comprehensive cohort training experience that leverages the unique co-location of the three Universities and is inherently multidisciplinary and international, extending well beyond an individual research project; and
3. add value to the UK economy by fostering a cohort of innovators in a geographical region which offers significant potential for increased productivity and growth.

4 ReNU Distinctive Attributes

- Over the next 8.5 years, ReNU will train 65 doctoral candidates in the area of small-to-medium scale renewable and sustainable distributed energy.
- ReNU is led by Northumbria University (UNN) and is a collaboration with Newcastle University (NU) and Durham University (DU). Each doctoral candidate is enrolled at the outset at one of the three universities and registered for a PhD under their individual university regulations.
- ReNU has a high quality core-training programme that engenders a whole systems approach and recognises that the energy sector is multi-dimensional and transcends disciplines. This programme is distributed evenly over a 4-year period.
- ReNU's training programme has been developed in consultation with the Institute of Physics (IoP), the Royal Society of Chemistry (RSC) and the Institution of Engineering and Technology (IET)
- ReNU builds on a scientific base of research excellence and infrastructure provided by the North East Energy Materials (NEEM) consortium initiative and the Industrial Strategy Challenge Fund-EPSRC [North East Centre for Energy Materials](#) (NECEM) encompassing the same core team as ReNU
- ReNU has a partner portfolio of 27 companies including 12 small and medium-sized enterprises (SMEs) and 8 non-profit organisations

5 Governance and Management

The organisation and structure of ReNU is shown in Figure 1. The Management Committee (MC), Strategic Advisory Board (SAB) and Delivery Groups (DGs) are all governed by a set of Terms of Reference that has been developed during the first year of operation.

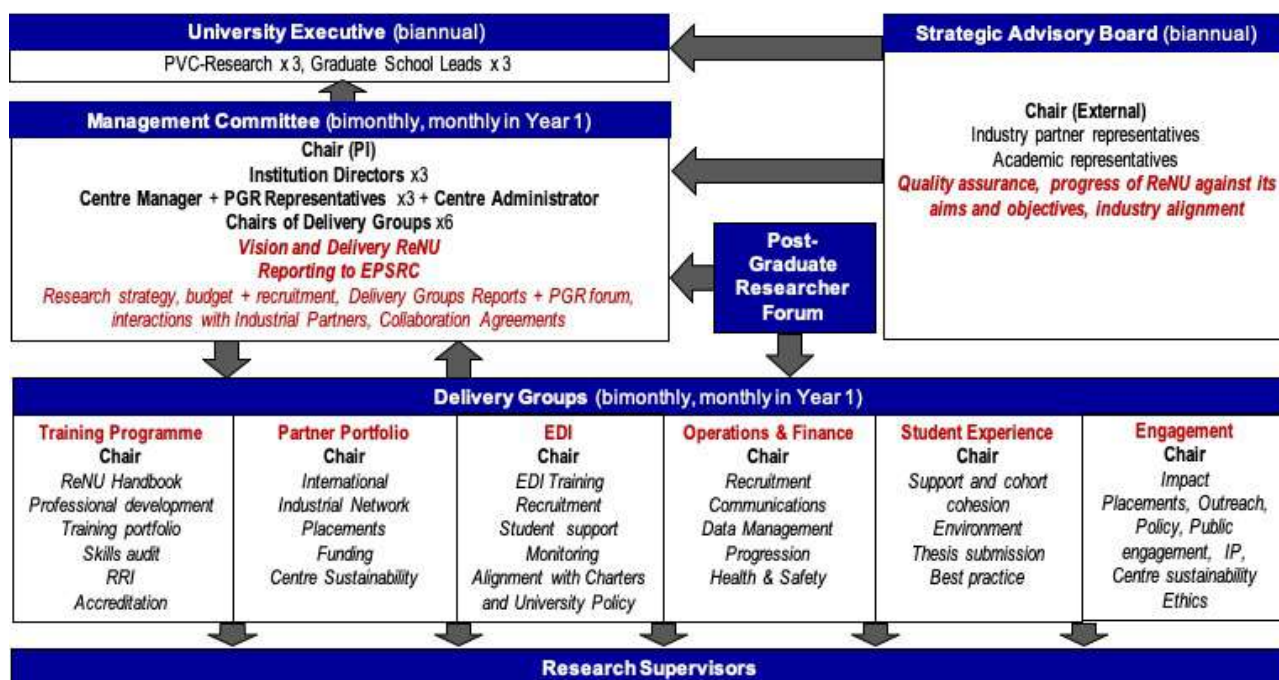


Figure 1: Governance structure of the CDT

5.1 Management Committee (MC)

The ReNU MC is composed of the named investigators, the Centre Manager, the Centre Administrator and doctoral candidate representatives. It has responsibility for the vision and operation of the CDT consistent with the project proposal. Note that the EPSRC Project Liaison Officer is formally a member and has access to all documents and the right to attend any meeting of the MC. In the first year of the programme the MC met monthly (from January 2019 to January 2020) and will meet every other month from March 2020. The MC responsibilities are defined in a Terms of Reference according to: Strategy and Policy Development; Operational; Approval; Monitoring and Review; and Reporting Relationship with Other Bodies.

5.2 Strategic Advisory Board (SAB)

The ReNU SAB is chaired by an external industry partner and is composed of the MC, industry representatives, the North East Local Enterprise Partnership, an EPSRC Project Liaison Officer, external academic advisors and non-profit organisations. The SAB met in November 2019 during CDT week and has responsibility for providing strategic oversight including independent review and recommendations to the Management Committee. An outcome of this meeting was to increase the frequency of SAB meetings to twice per year and the next meeting is scheduled for April 2020.

5.3 Delivery Groups (DGs)

There are six delivery groups overseeing operational aspects of the CDT and these are shown in Figure 1. These involve a named investigator as Chair as well as academic supervisors of doctoral projects in addition to doctoral candidate representation. The DGs meeting on average every two months depending on priorities.

5.4 ReNU Manager and Academic Support Coordinator

In July 2019, ReNU appointed a Centre Manager and administrator (Academic Support Coordinators). The Centre Manager position is a 1.0 FTE permanent academic position in the Department of Mathematics, Physics and Electrical Engineering at Northumbria University. This post has an 0.5 FTE secondment to the CDT for its duration that is funded by EPSRC. The administrator position is a 0.5 FTE post funded entirely by EPSRC.

5.5 Risk Management and Mitigation

In July 2019, Northumbria University's Risk Manager delivered a training session to the ReNU MC with the objective of creating a risk register. This resulted in an initial risk register detailing project risks, controls, risk rating, mitigation actions, timescales and owners. The risk register is reviewed at MC meetings.

5.6 Systems and Tools

A ReNU Microsoft SharePoint site is hosted at Northumbria University is available to all ReNU investigators, Professional Support Staff and Graduate Schools across the three institutions. This site includes terms of reference for the delivery groups and minutes of the MC. This site is also linked to a ReNU Microsoft Teams site which is accessible to doctoral candidates and provides a single virtual location for all training materials used in the training programme.

6 Cohort 1: Doctoral Candidate Recruitment

6.1 Principles

In recruiting doctoral candidates, we applied a number of strategic principles including: quality; emphasis on industry involvement in projects; balance across the partner universities; gender balance; and balance across technical themes. Given that the timing public announcement of the outcome of the 2018 EPSRC national CDT exercise allowed only a relatively short period to recruit the first cohort of doctoral candidates, quality was prioritised in order to manage the risk associated with national competition for candidates.

6.2 Process

6.2.1 Marketing

Recruitment of high quality doctoral candidates for Cohort 1 was a strategic priority supported by the following actions:

- **creation of marketing materials:** logo, flyers, banners, video content, [website](#), Twitter (@CDT_ReNU), FindAPhD landing page;
- **dissemination of marketing materials through appropriate channels:** formal and informal academic networks (EPSRC SUPERGEN SuperSolar, Solar Fuels Network), social media and national conferences;
- **advertisement of PhD projects** on FindAPhD and partner institution websites; to undergraduate science, technology, mathematics and engineering (STEM) degree programmes at partner universities.

Note that these actions relate specifically to Cohort 1 and will be expanded and improved for subsequent recruitment cycles (see 6.2.3).

6.2.2 Project allocation and selection

ReNU projects are allocated according to an annual quota of 5 at Northumbria, 4 at Newcastle and 4 at Durham. The allocation process seeks to balance strategically shaping the portfolio across ReNU topics and investigators whilst ensuring the appointment of quality doctoral candidates and industry involvement. The process also seeks to devolve management to the three individual IDs on behalf of their universities and working as a group for consistency, whilst including the MC step for oversight.

The process is described in the following steps but it is important to note that the offer an individual studentship is devolved to each ID where the doctoral candidate will be enrolled as a student and registered for a PhD.

1. Three IDs agree a consistent approach to applications, interviews and offers consistent with the three University processes.

2. All proposals checked for linguistic gender bias using software <http://gender-decoder.katmatfield.com>.
3. IDs and co-investigators within an institution meet to review and rank project proposals using quality and fit to scope as the main criteria. The top 8 project proposals are taken forward to the MC.
4. The ReNU MC meets to review 24 project proposals (8 from each institution) and selects 18 for advertisement after consideration of the principles listed in section 5.1
5. Following an advertisement period of 4-6 weeks, interviews are held at each institution with the host ID attending all interviews.
6. Offers are made to the best candidate for each project. If no offer is made, a project is re-advertised.

6.2.3 Outcome and Review

The data in Table 1 indicates that 12 doctoral candidates were recruited to Cohort 1. ReNU has an overall aspiration to recruit a minimum of 33% of any single gender. While the applications data are below this value, the actual number of doctoral candidates recruited met this aspiration i.e. 4/12 doctoral candidates in Cohort 1 are female.

Data from the Higher Education Statistics Agency (HESA) indicates that in 2018/19 43% of undergraduate students studying Physical Sciences at university were female compared with 19% of students studying Engineering and Technology. Aggregating across STEM subjects, this indicates that ReNU's aspiration to recruit doctoral candidates with a minimum of 33% of any single gender is challenging but reasonable.

Similarly, a Royal Society of Chemistry report¹ indicates that in 2016, 44% of undergraduate chemistry degree intake in the UK was female. The combination of these data and the values in Table 1 lead to the conclusion that ReNU projects with a strong chemistry component appeal to female applicants and perhaps explain the significantly higher number of applications from females at Newcastle University where there is particular strength in the chemistry discipline.

Table 1: Applications data for Cohort 1 at Northumbria (UNN), Newcastle (NU) and Durham (DU).

Institution	Female Candidates			Minority Candidates			Total No. of Candidates		
	Applied	Shortlisted	Appointed	Applied	Shortlisted	Appointed	Applied	Shortlisted	Appointed
UNN	2	1	1	3	1	0	13	5	5
DU	0	0	0	15	3	0	24	11	3
NU	11	4	3	12	0	1	26	7	4
Total	13	5	4	30	4	1	63	23	12

Following the conclusion of the recruitment process for Cohort 1, the ReNU MC and IDs reviewed the process resulting in the following actions which have been completed:

- Updated marketing materials to reflect best practice in equality, diversity and inclusivity (EDI)
- Hosting 6th NEEM event to promote industry participation in doctoral projects
- Revision of project selection principles to emphasise cash contributions
- Marketing materials for Cohort 2 recruitment sent to academics at multiple UK universities

¹ *Diversity landscape of the chemical sciences*, A report by the Royal Society of Chemistry, 2016

- Creation of new marketing materials targeting industry
- Adverts for Cohort 2 placed 2-3 months earlier than for Cohort 1
- Standardisation of interview questions across the partners
- Consistent engagement of Business Development Managers across the three institutions
- Circulation of existing and proposed projects to all industry partners inviting contributions

7 Equality, Diversity and Inclusivity (EDI)

ReNU takes seriously its responsibility to offer equality of opportunity to all staff and doctoral candidates and is keenly aware of the challenges facing STEM subjects in increasing diversity. The three Universities in ReNU all hold Athena SWAN awards at Institutional Level. Newcastle University holds a Silver Award, and Durham and Northumbria hold Bronze Awards.

All ReNU doctoral candidates and academic supervisors have participated in unconscious bias training

In addition to specific aspects of EDI in the recruitment of doctoral candidates described in section 3.3, EDI is considered in all aspects of the delivery of ReNU. Responsibility for EDI lies with the EDI DG which finalised its Terms of Reference in summer 2019 and has met monthly since September 2019 with Student Representatives from each partner institution joining in October upon their enrolment. Additional support for EDI within ReNU is provided by [NUSTEM](#) which is a flagship outreach programme at Northumbria University that encourages girls and pupils from diverse backgrounds in the North East to study STEM and pursue STEM careers, using aspects of Science Capital². NUSTEM was initially conceived as Think Physics in 2014 and was funded via a £1.2M award from HEFCE (now OfS). Since 2014, NUSTEM has recorded over 17,550 interactions with young people across the North East of England.

NUSTEM is a key part of ReNU's outreach strategy and has delivered unconscious bias training to both Cohort 1 (November 2019) and ReNU academic supervisors (January 2020). The latter training was informed by NUSTEM's observations of ReNU academic staff delivering taught content in the core training module, *Renewable Energy and Distributed Energy Technologies (C2)*.

8 Training Programme

8.1 Introduction

ReNU has a high-quality training programme comprising core and optional modules. This programme was co-designed with industry through a joint workshop in which companies stressed the need for doctoral candidates to be able to: “*communicate complex ideas simply*” and “*understand the business context and big picture*”. In addition, industrial partners identified negotiation, project management and knowledge of the legal and regulatory environments as particularly important.

An overview of the ReNU training programme is shown in Figure 2. The underlying philosophy of the programme is to develop technical research excellence in parallel with strong understanding of the multi-dimensional nature of the energy sector from economics to society and from management to innovation. The programme includes core modules C1-C10 as well as optional modules O1-O10. Core modules provide fundamental technical detail and broader skills while the optional modules allow doctoral candidates to develop expertise that is particularly relevant to their individual project. In addition to the ReNU training programme, Figure 2 also shows that doctoral candidates participate in mandatory postgraduate training at their host institution. More details of these modules are available in the Programme Handbook which doctoral candidates receive in induction.

² *ASPIRES Young people's science and career aspirations age 10-14*, King's College London, 2013

A key theme of the programme is to establish a cohort identity and this begins immediately upon enrolment and induction week (C1) when doctoral candidates attended (October, 2019) a welcome reception and participated with ReNU staff in a residential visit to Kielder Observatory in the Northumberland National Park involving:

- a data acquisition and coding exercise to measure the output from a hobbyist solar cell using an Arduino;
- invited talk from the Director of the Durham Energy Institute; and
- evening event at the Kielder Observatory.

Students’ feedback from the visit was positive including:

“There were plenty of opportunities to interact both socially and in a work capacity.”

“Very good interdisciplinary talk and important to have a global view of the economics and politics rather than a solely scientific in order to enable opportunities.”

“Kielder was great but I enjoyed the Arduino challenge.”

Suggestions for improvements were centred on increasing the diversity of the data acquisition and coding challenge as well as spending more informal time getting to know ReNU staff.

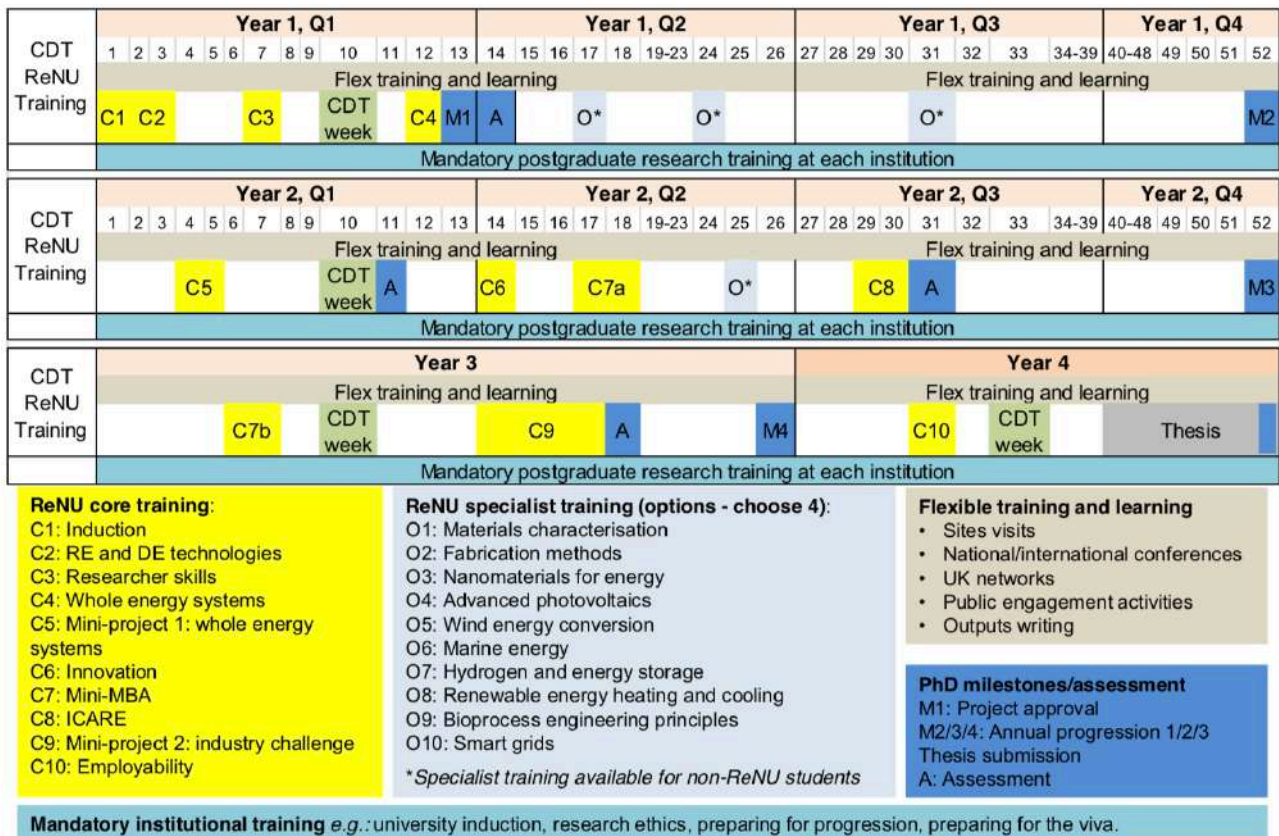


Figure 2: Overview of ReNU training programme.

Following induction, doctoral candidates participated in modules C2 to C4. C2 was a two-week block module covering the fundamentals of solar photovoltaics, wind energy, thermal energy storage, fuel cells, batteries and materials science and characterisation. Students’ feedback was generally positive although a small number of instances of content repetition were identified. This can be offset against the benefits of the training being delivered across the three partner sites and will be improved for Cohort 2. C3 allowed doctoral candidates to develop critical research skills for example in programming, data acquisition and data analysis. These training activities were very much focused

on practical exercises (using a microcontroller to read data from an accelerometer and display it using LEDs) and were complemented by wider aspects of research including responsible research and innovation, impact and scientific publishing delivered by an editor for a Springer Nature journal.

An important theme within ReNU is the whole energy systems context for an individual doctoral candidate's research project. Therefore, C4 involved doctoral candidates learning about the wider electricity and heating networks including photovoltaics and coal. Furthermore, through expertise at the Durham Energy Institute, doctoral candidates were introduced to the importance of social sciences and policy in energy.

8.2 CDT Week

A feature of the ReNU training programme is an annual CDT week which was held at Northumbria University from 18-22 November 2019. The main components of this week were:

- **Monday:** Scientific presentations by doctoral candidates detailing their projects to a broad audience of ReNU academics, external advisors and industrialists. Innovation training for doctoral candidates delivered by an external industry partner.
- **Tuesday:** 6th North East Energy Materials (NEEM) meeting involving a programme of industry talks, break-out and poster sessions and dinner promoting interaction between doctoral candidates and industrialists.
- **Wednesday:** Unconscious bias training for doctoral candidates and meeting of the ReNU strategic advisory board. Doctoral candidates visited the Offshore Renewable Energy Catapult in Blyth for a tour and view of world's longest wind turbine blade in the test facility
- **Thursday:** Meeting of doctoral candidate postgraduate researcher forum
- **Friday:** Policy training for doctoral candidates provided by Newcastle University Policy Academy

Innovation training delivered by an industrial partner allowed doctoral candidates to understand the R&D funnel from idea to deployment and the critical importance of collaboration.

8.3 ReNU Training for Supervisors

As well as creating a high quality training experience for doctoral candidates, the ReNU programme includes supervisor training with the aim of disseminating insights to the benefit of postgraduate communities across the institutions and beyond. A further advantage of this approach is that it fosters a sense of community among supervisors thereby complementing the cohort approach.

All ReNU academic supervisors are required to undertake unconscious bias training (see section 7). Additionally, all supervisors participated in Responsible Research and Innovation (RRI) training in September 2019. The ReNU approach to RRI involved engaging the EPSRC-backed consultancy, [ORBIT](#) to deliver a 3-day RRI Practitioner course to supervisors. The aim of this approach is to train a new group of trainers (ReNU supervisors) for the benefit of ReNU and the partner institutions more broadly. The ORBIT approach is based on the [Anticipate, Reflect, Engage and Act \(AREA\) 4P framework](#) and during the workshop supervisors gained hands-on experience of ORBIT's RRI self-assessment tool which was subsequently used by ReNU doctoral candidates in C3.

The ReNU approach to responsible research and innovation (RRI) training is to "train the trainers". All ReNU academic supervisors are Registered Practitioners in RRI.

Recognising the importance of mental health in higher education, ReNU supervisors and doctoral candidates participated in a joint mental health workshop at Newcastle University in January 2020. This training was delivered by the Durham University Counselling Service, further leveraging the opportunities afforded by the unique geographical proximity of the partners. The workshop allowed doctoral candidates and their supervisors to explore the student-supervisor relationship and the factors influencing wellbeing.

8.4 Professional Accreditation

In designing the training programme, the ReNU team engaged with three professional, statutory and regulatory bodies (PSRBs), the IOP, RSC and IET with the aim of seeking accreditation. Discussions with the IOP and RSC have progressed and ReNU Co-Is with Chartered Physicist and Chartered Chemist have been identified according to IOP/RSC requirements. An application for accreditation for all doctoral candidates to become *Registered Scientist (RSc)* is now in preparation. This also provides the foundations for doctoral candidates to apply for chartered status followed the completion of their PhD. The focus of accreditation activities has been on the RSC/IOP and the involvement of the IET will be reviewed in the coming academic year.

8.5 Doctoral Candidate Experience

Doctoral candidates participate in regular formal and informal meetings to discuss their experiences on the ReNU programme. Three meetings have been held in November (Northumbria), December (Durham) and February (Newcastle) and formats have included both being led by doctoral candidate representatives as well as the Chair of the Student Experience DG. Generally, doctoral candidates are very engaged and positive as well as offering suggestions for improving the programme such as:

- creating more events for doctoral candidates and academic staff to interact informally;
- implementing carbon offsetting that improves biodiversity for ReNU travel;
- facilitating better access to shared experimental facilities across the partners;
- contextualising core training modules according to academic backgrounds and projects;
- seeking more opportunities to interact with industry; and
- proposing future site visits.

Feedback from these meetings are reviewed at the MC meetings as well as with individual supervisors via the Centre Manager. Most actions are in progress with some completed including a festive season meal in Durham attended by doctoral candidates and ReNU academics and training delivered by industry partners.

A key aspect of ReNU is the provision of training activities which promote cohort identity through a broad perspective of the energy sector. Doctoral candidate attendance in these activities is >90% for all core training modules to date. In addition to these activities, a range of social interactions and social media provide further cohort cohesiveness. This includes evening social occasions (e.g. CDT week and over the festive season) as well as social media (Facebook Messenger) to share ideas and details of relevant events and conferences.

9 Partners

ReNU has a portfolio of 35 partners including 27 companies (of which 12 are SMEs) and 8 non-profit organisations that have pledged £2.9M of support. This portfolio of partners has been built over several years through the North East Energy Materials (NEEM) series of meetings. This series of meetings was established in 2016 to enable the consortium to better exploit research excellence in energy materials and engage with industry.

ReNU doctoral candidates visited ORE Catapult's world-leading 100m blade test facility in Blyth to see the world's longest wind turbine blade and the impact of excellence in R&D.

9.1 NEEM 6

This day-long meeting was held at Northumbria University in November 2019 as part of the inaugural CDT week (see Figure 2) and involved 30 registered guests from industry. A large proportion of the meeting was dedicated to industry talks spanning three themes:

- Applied materials for innovations in renewable energy

- Systems integration of renewable energy
- Whole energy systems

NEEM 6 provided an important opportunity for ReNU's doctoral candidates to engage with industry and also for industry to shape existing and proposed doctoral projects. This was achieved via a poster session over lunch and a break-out session in small groups for doctoral candidates to discuss the wider context for their project and plan an individual mini-project (C5). The interaction with industrial visitors continued through the day with facilities tours and an evening dinner.

9.2 Industry Involvement in Doctoral Projects

ReNU aims to involve an industry partner or external organisation in every doctoral project. The majority of this support for Cohort 1 is in kind for example, provision of pipeline materials for testing coatings for hydrogen transport, delivery of vacuum training course for physical vapour deposition and modelling of thin film microanalysis. This support is invaluable and often amounts to a significant commitment. Due to the relatively late date of the announcement of the CDT award by EPSRC, the MC identified recruitment of sufficient numbers of quality doctoral candidates to Cohort 1 as one of the major risks. Consequently, engagement by industry was prioritised over cash contributions for Cohort 1.

Actions taken to increase the likelihood of industry cash contributions are:

- **Engagement of business development managers across the partner institutions.** This has enabled coherent targeting of industry contributions through monthly update meetings (involving the three BDMs) and a shared electronic document to track interactions.
- **Promotion of ReNU through network organisations** including the Knowledge Transfer Network's Energy team, NOF Energy and ISCF-EPSRC NECEM.
- **Preparation of a Partners Handbook and marketing materials** detailing opportunities to sponsor doctoral projects and benefits to industry.
- **Circulation of existing and proposed doctoral projects to ReNU partners.** All ReNU partners were invited to provide sponsorship for both Cohort 1 and 2 projects.
- **Engagement with the EPSRC CDT in Sustainable Electric Propulsion** to share best practice in attracting industrial support.
- **Adaptation of recruitment processes to offer greater flexibility** for example by ring-fencing 1 studentship for industry support across each institutions' allocation i.e. this offers increased scope for responding to industry needs during the recruitment process.

A one-day workshop delivered by an industrial partner allowed students to develop highly transferrable skills with industry-standard vacuum equipment and deposition methods.

10 Internationalisation

Every ReNU doctoral candidate will have the opportunity for international travel through visits to partner laboratories for example at NTU, Singapore; University of Calgary, Canada; and the University of Luxembourg, Luxembourg. Additionally, ReNU has a short-term placement opportunity for every doctoral candidate to visit the Institute for Clean and Renewable Energy on campus at Huazhong University, Wuhan. This opportunity however is now subject to Health and Safety approval and would only occur follow lifting of UK Government Travel Advice relating to the COVID-19 outbreak. In light of this global pandemic in 2020, the MC is developing proposals for an alternative option for Spring 2021 when the first visit was due to take place.

11 Looking Ahead

Following a very successful first year, ReNU now moves forward into its second year with a focus on continuing to recruit high quality doctoral candidates with increased direct cash contributions from

industry. It is anticipated that this will be enabled by the combination of increased brand recognition nationally and internationally as well as an earlier recruitment campaign for Cohort 2. Other recruitment principles will remain constant including those around gender balance and in kind project contributions from industry.

A key feature of the training plan is internationalisation. This activity will be reviewed in the context of the outbreak of the global pandemic, COVID-19, with appropriate contingency opportunities. Additional training activities include a mini-MBA and innovation training all of which will feed into the process of Doctoral Candidates gaining Registered Scientist status through professional body accreditation.

Finally, in welcoming Cohort 2 to ReNU in October 2020, cohort-to-cohort interactions will be available for the first time. This includes induction activities (October) and CDT week (November) and will result in new opportunities in mentoring and skills training for doctoral candidates as well as broader engagement and interaction between academic supervisors not only across specialisms but also in RRI and EDI.

Appendix 1: ReNU People



[Prof. Glen McHale](#) – ReNU Chair and Principal investigator

glen.mchale@northumbria.ac.uk

Tel: 0191 227 3660

ReNU topics: Energy conversion and transfer



[Dr Neil S Beattie](#) – Institution Director, Northumbria

neil.beattie@northumbria.ac.uk

Tel: 0191 227 4592

ReNU topics: Photovoltaics, earth abundant materials

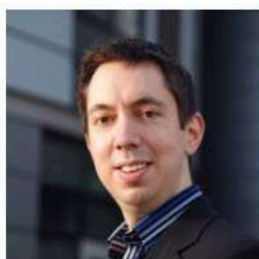


[Dr Elizabeth Gibson](#) – Institution Director, Newcastle

elizabeth.gibson@ncl.ac.uk

Tel: 0191 208 5541

ReNU topics: Solar fuels, photovoltaics



[Dr Chris Groves](#) – Institution Director, Durham

chris.groves@durham.ac.uk

Tel: 0191 334 2495

ReNU topics: Energy conversion and transfer, photovoltaics



[Dr Yongtao Qu](#) – Centre Manager

y.qu@northumbria.ac.uk

Tel: 0191 227 3259

ReNU topics: Earth abundant materials, Photovoltaics



[Dr Vincent Barrioz](#) – Partners Portfolio Chair

vincent.barrioz@northumbria.ac.uk

Tel: 0191 349 5366

ReNU topics: Smart grid and systems, photovoltaics



[Dr Eillen Yu](#) – Training Programme Chair

eileen.yu@ncl.ac.uk

Tel: 0191 208 7243

ReNU topics: Biofuels, solar fuels



[Dr Guillaume Zoppi](#) – Operations & Finance Chair

guillaume.zoppi@northumbria.ac.uk

Tel: 0191 243 7013

ReNU topics: Earth abundant materials, photovoltaics, transparent electrodes



[Dr Budhika Mendis](#) – Equality, Diversity and Inclusion Chair

b.g.mendis@durham.ac.uk

Tel: 0191 334 3554

ReNU topics: Earth abundant materials, photovoltaics



[Dr Douglas Halliday](#) – Student Experience Chair

d.p.halliday@durham.ac.uk

Tel: 0191 334 3571

ReNU topics: Earth abundant materials, photovoltaics



[Dr. John Errington](#) – Engagement Chair

john.errington@ncl.ac.uk

Tel: 0191 208 6643

ReNU topics: Molecular and solid state chemistry and metal complexes



Li Chin Khor – Centre Administrator

li.khor@northumbria.ac.uk

Tel: 0191 349 5829

Contact:

Dr Neil Beattie
Northumbria University
Newcastle upon Tyne
NE1 8ST

Tel: +44(0)191 227 4592

Email: neil.beattie@northumbria.ac.uk