



Smart Energy Network Demonstrator (SEND) Interim Summative Assessment

October 2021



Wavehill: social and economic research

- Wales office: 21 Alban Square, Aberaeron, Ceredigion, SA46 0DB (registered office)
- West England office: 2-4 Park Street, Bristol, BS1 5HS
- North of England office: Milburn House, Dean Street, Newcastle, NE1 1LF
- London office: 52 Cecile Park, Crouch End, London, N8 9AS

Contact details:

Tel: 01545 571711

Email: wavehill@wavehill.com

Twitter: @wavehilltweets

More information:

www.wavehill.com

<https://twitter.com/wavehilltweets>

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Report authors:

Stuart Merali-Younger

Any questions in relation to this report should be directed in the first instance to Stuart Merali-Younger (Stuart.Merali-Younger@wavehill.com)

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Client contact:

Mark Dimmock | m.dimmock@keele.ac.uk

List of abbreviations

BEIS	Department for Business, Energy and Industrial Strategy
CO ² e	Carbon Dioxide or equivalent
DECC	Department for Energy and Climate Change
EPSRC	Engineering and Physical Science Research Council
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
LEP	Local Enterprise Partnership
LIS	Local industrial strategy
NUTS	Nomenclature of Territorial Units for Statistics
OFGEM	Office of Gas and Electricity Markets
PCR	Project Change Request
PEG	Project Executive Group
POG	Project Operational Group
R&D	Research and development
RD&I	Research, development and innovation
SBEN	Staffordshire Business and Environment Network
SEND	Smart Energy Network Demonstrator
SME	Small and medium sized enterprise
SSLEP	Stoke and Staffordshire Local Enterprise Partnership
TINA	Technology and Innovation Needs Assessment
UKRI	UK Research and Innovation

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1 Introduction

Wavehill was appointed by Keele University to undertake an interim and final Summative Assessment of the Smart Energy Network Demonstrator (SEND) project. This report is the interim evaluation report.

The SEND Project is a £16.6m project which seeks to establish a world class demonstrator facility for smart energy research, development and innovation (RD&I). The project will enable businesses to develop, test and evaluate new energy technologies, and allied services, on a smart energy network demonstration system, in order to assess their efficiencies in terms of system integration, energy reduction, cost and greenhouse gas emissions. The overall project comprises:

- Investment in capital equipment, facilities and plant to convert an existing energy supply network into a smart energy network demonstrator (SEND) RD&I facility
- A supply chain development programme for smart energy technologies and services
- A collaborative RD&I product development programme with eligible companies and universities to support the development and commercialisation of new SMART energy products and services using the SEND RD&I facility.

The project falls under the ERDF Priority Axis 4: Supporting the shift towards a low carbon economy in all sectors¹ and Investment Priority 4f. SEND began in January 2017 and the completion date is June 2023.

1.1 Evaluation approach

This evaluation adopts an approach which is consistent with the requirements of the European Structural and Investment Fund (ESIF) programme and associated guidance. The evaluation is an independent review of project performance, underpinned by five key requirements, as set out in national programme guidance. These are:

- 1) **Relevance and consistency:** exploring the continued relevance and consistency of the project in light of contextual changes, such as shifts in policy, economic circumstances and technological advancements
- 2) **Progress against contractual targets:** setting out project progress when measured against contractual targets, over/under performance and projected lifetime results at project closure
- 3) **Experience of delivering and managing the project:** outlining the practical experience of implementing and managing the project, lessons learned and evidence of best practice which can be applied to the delivery of other projects
- 4) **Economic impact attributable to the project:** demonstrating the economic impacts attributable to the project, capturing those that were intended, actual and also wider outcomes which have provided added value to the local economy

¹ European Regional Development Fund Operational Programme 2014-2020

- 5) **Cost effectiveness and value for money:** a robust assessment of cost-effectiveness and value for money based on the balance of quantified costs and benefits, in light of intended and unintended impacts.

The evaluation draws from a variety of relevant information, data and qualitative insights:

- **A review of background documentation** submitted as part of the ESIF bid, to understand this in detail and assess its continued relevance
- **Detailed analysis of project monitoring data**, captured by the team and via beneficiaries, to assess performance against financial, output and result targets
- **A review of changes in the delivery context** considering economic, policy and organisational dynamics which are likely to have impacted on the delivery and impact of the project
- **Stakeholder consultations**, engaging the core delivery team and external stakeholders, capturing perspectives on project design, delivery, governance and impacts
- **Beneficiary surveys** gathered via an online survey, designed to explore business sentiments, satisfaction levels, impacts achieved and how the project could evolve to better meet their needs and support growth aspirations
- **Beneficiary case studies**, allowing for more in-depth analysis of impacts for a number of supported businesses.

1.2 Structure of Report

The remainder of this report is structured as follows:

- **Chapter 2:** A review of the original project rationale and associated logic model
- **Chapter 3:** Setting out key contextual changes that have taken place since the project's conception and have subsequently impacted on project performance
- **Chapter 4:** A summary of project performance, benchmarked against contractual financial, output and result targets
- **Chapter 5:** A summary of delivery progress, considering marketing and engagement, beneficiaries supported, quality of support, management and governance
- **Chapter 6:** An outline of early evidence on project outcomes and impacts achieved to date
- **Chapter 7:** A summary of research conclusions and recommendations.

2 Project Overview

This section sets out the project's logic model which details the rationale, market failures, inputs, activities, outputs and intended impacts of the project. The content set out in the logic model will be used to assess the project's effectiveness and impact. The logic model has been developed through reviewing project documentation as well as through conversations with the delivery team.

2.1 Rationale and project need

The project application sets out a range of evidence for the rationale and need for this project:

- **Climate Change Act** – the Act establishes a legally binding target to reduce the UK's greenhouse gas emissions by at least 80 per cent below base year levels by 2050. To achieve this target investment is needed in technology which helps to increase generation and use of renewable energy and improve conservation of energy
- **Smart Grids Supported by Government Policy** - The Smart Grid Forum – set up by DECC (now BEIS) and OFGEM – has highlighted the potential benefits from developing the industry, in the form of reduced costs to consumers, enhanced energy security and enabling the integration of low carbon technologies²
- **Need for Demonstration** - development of new technology requires demonstration in situ, which the SEND project will provide. The importance of a SEND type initiative has been highlighted as one of the four priorities for public sector support identified in the Low Carbon Innovation Coordination Group Technology and Innovation Needs Assessment (TINA)³
- **Opportunity for Demonstration** - the project will be delivered on the campus of Keele University which has a self-contained and privately owned and operated network of energy assets (electricity, gas, heat, water, waste-water and telecommunications) with real world energy demands covering domestic, commercial and industrial users, at the scale of a small town
- **Local Strategic Alignment** - the project aligns with key local strategies, including SSLEP ESIF Strategy (February 2016) under Priority Theme 4, Supporting Low Carbon; and SSLEP City Deal.

2.2 Market Failures

For the capital investment, the most relevant market failure is the **negative externality** represented by greenhouse gas emissions causing climate change. Public sector investment is needed to limit the effects of climate change, as the costs of emissions do not fall on those conducting activities that emit greenhouse gases.

² Smart Grid Forum (2014) Smart Grid Vision and Routemap

³ Low Carbon Innovation Coordination Group (2012) Electricity networks and storage Technology and Innovation Needs Assessment (TINA)

For the revenue activities, there are market failures relating to **imperfect information** around development of new technologies. The ‘valley of death’ is a term used to describe the risk challenges of investing in technology at an early stage when its viability is still unknown. Public sector support can help to reduce the risk of investment at this stage. This imperfect information can similarly apply to firms seeking support around business innovation, where there may be a reluctance by firms to pay for support for which the benefits are unknown.

2.3 Objectives

The project will deliver seven specific objectives:

1. Deliver Europe’s first “at scale” multi-energy-vector smart energy network demonstrator
2. Integrate real domestic, commercial and light industrial energy demands with a range of distributed energy resources into an at scale demonstrator
3. Deliver direct carbon savings of 2,967 tCO₂e per annum relative to 1990 levels
4. Engage 26 medium-sized companies in Stoke-on-Trent and Staffordshire in intensive collaborative programmes of research to develop new products and services for international markets *[note: this target was increased as part of the project extension]*
5. Deliver carbon savings of 1,129 tCO₂e per annum relative to 1990 levels as demonstrated by implementation of new products and services onto the SEND
6. Engage with 243 (217 supply chain assisted, plus 26 enterprises cooperating with research entities) local businesses to use the demonstrator as the basis to better exploit new and significant global markets for smart energy technologies *[note: this target was increased as part of the project extension]*
7. Contribute to the delivery of the Stoke and Staffordshire LEP strategic economic plan and ESIF strategy and specifically furtherance of the area’s comparative advantage in the low-carbon / energy sector.

2.4 Inputs

The total funding for the project is £16.63m. This comprises £9.97m of ERDF funding and £6.66m of public match funding. These figures represent the project finances following an extension application approved in 2021; the original overall project value was £15.02m.

The table below shows the breakdown and source of project funding.

Table 2.1: Breakdown of funding sources for SEND

Funding Contributions	CAP (£m)	REV (£m)	TOTAL (£m)
ERDF	4.31	5.66	9.97
BEIS	4.56	0	4.56
Keele University	0	2.10	2.10
TOTAL	8.87	7.76	16.63

2.5 Activities

2.5.1 Infrastructure Investment

The capital investment in SEND comprised investment in building and construction, plant and machinery and professional services.

The investments made helped to deliver seven main capability areas (value packs), outlined in the table below. The table shows each value pack, explains the benefit of what was delivered and gives examples of the types of new commercial products and services that could be tested using the new infrastructure.

Table 2.2: Summary of Infrastructure Investment

Value Pack	RD&I and Demo Capacity Delivered	Examples of New Commercial Products / Services
Basic information management	As is energy usage, energy supply and usage data, inputs for modelling	New data based services
Basic demand side management	Integration of smart meter and home network, appliance level load control	New products / services to support demand side management
Advanced metering infrastructure and heat load analysis	Integration of power, gas, heat supply and usage for whole system modelling	Development of new services to enable balancing across energy vectors
Integrated energy systems, leveraging advanced information management	Enables renewable energy and storage balancing across whole system	New renewable energy solutions across energy vectors
Realising micro-grids through advanced distributed energy resources (DER) management	Enables scheduling / dispatching of renewable DER to balance micro-grid	New companies / services to enable localised energy markets to operate efficiently
Unlocking low carbon transport potential	Enable charging and storage “vehicle-to-grid” capability	New products / services to support the growth of alternative fuel vehicles
Introduce self healing network characteristics	Management of energy networks to overcome congestion points & reduce/delay upgrade investment	New companies/ services to deliver congestion management services to network operators.

2.5.2 Supply Chain Development Programme

The aim of this programme was to provide support to eligible businesses to appraise their commercial opportunities to develop and commercialise new products and services to meet the growing global market for smart energy network technologies.

It was expected that this assistance would include:

- Market research into the market opportunities for new low-carbon technologies to underpin improved company performance
- Opportunities for short pieces of collaborative product and service development by engaging with the SEND demonstrator to generate case study and benchmark data
- Expertise to develop R&D plans for new product or service development
- Expertise on the commercialisation of outcomes from applied research
- Advice on international commercial and intellectual property law and regulation
- Advice on international corporate supply chains
- A programme of events, and seminars to promote the production and distribution of energy from renewable sources including outputs from academic and business RD&I projects conducted using the SEND
- The presentation of new business opportunities that arise from RD&I projects conducted on the Keele University energy system.

2.5.3 Collaborative RD&I Product Development Programme

The aim of this programme was to offer a collaborative RD&I product development programme to support high technology businesses over an intensive 3-year period carry out collaborative research, development and innovation with UK universities, to underpin the commercialisation of new products and services for global smart energy markets.

At the heart of this programme would be a team of Graduate Researchers and Engineers (both from Keele, and procured from other universities) working to support eligible businesses. Keele University would lead the development, publication and wide dissemination of a LEP-wide call for eligible businesses to bring forward proposals for collaborative RD&I projects using the SEND in partnership with a named university.

Project proposals from eligible businesses (in partnership with a named university) would be considered against key criteria, including:

- Business eligibility
- A measure of how clearly the proposed programme of RD&I will underpin the development of new products and services
- Global market opportunity the project aims to help access
- Necessity of proposed use of the SEND, as opposed to other facilities locally or nationally;
- Potential for sustainable, high value job creation
- Expertise, experience and suitability of the university partner to supervise the programme of collaborative RD&I and ability to provide a suitably qualified Graduate Researcher or Engineer to carry out an intensive programme of RD&I

- Specific expertise of the named university supervisor of the programme of work

Each RD&I programme would consist of a three-year programme of collaborative product development activity, using a graduate researcher and university-based RD&I supervisory team.

2.6 Outputs and Outcomes

The table below sets out the original project targets and the latest revisions following project change requests (PCRs).

At the time of writing, the project had submitted five PCRs:

- The first, submitted in March 2017, did not affect spend or output targets
- The second, submitted in December 2017, altered the profile of capital expenditure and output targets, and shifted some funding from capital to revenue, however did not affect overall spend or output targets
- The third, submitted in August 2018, included changes to the spend profile but not overall project spend. It included uplift to a number of indicators, partly reflecting the incorporation of 3-month alongside 3-year RD&I collaboration business assists
- The fourth, submitted in February 2019, included a minor uplift in revenue funding for the scheme, and a minor uplift in some of the outputs
- The fifth, submitted in November 2020 was the main project extension request and led to a more significant uplift in revenue funding and output targets. The latest revised figures agreed are as shown in the table below.

Table 2.3: Summary of project outputs

Output	Original Target	Revised Target
Number of enterprises receiving support	243	263
Number of enterprises receiving non-financial support	243	263
Number of new enterprises supported	9	18
Number of enterprises cooperating with research institutions	26	61
Number of enterprises supported to introduce new to the firm products	7	17
Estimated annual decrease of GHG (tonnes CO ₂ e)	4,096	4,523

2.7 Project Impacts

The outputs are expected to drive outcomes and subsequent impacts. The project outcomes are as follows. These are not core indicators for the purposes of ESIF funding, however are useful indicators to track the longer term outcomes for supported businesses.

- Net additional jobs created in supported businesses
- Net additional gross value added generated in supported businesses

3 Changes to Delivery Context

This section sets out the socio-economic and policy context SEND has operated in and considers the potential impacts this has had on the project's original rationale. The delivery context can play a significant role in a project's success and therefore understanding the tangible or more discrete shifts in the delivery context is integral to an assessment of progress.

3.1 Innovation

The UK Innovation Survey shows that in 2016-2018, 38 percent of UK businesses were innovation active which is a decrease compared to 49 percent in 2014-16.⁴ Large businesses are more likely to innovate than SMEs with 50 percent of large businesses innovation active compared to 37 percent of SMEs⁵.

UK expenditure on R&D is stalling. It grew by £822 million to £25.9 billion in 2019; this was an increase of 3.3 percent and was the lowest rate of growth since 2012. The spend on R&D within the Shropshire and Staffordshire region is amongst the lowest in the country. In 2017, businesses spend £214 Million on R&D which is the ninth lowest expenditure of any NUTS 2 region.⁶

The percentage of new businesses showing high growth in the West Midlands region is around 4.1 percent which is below the national figure of 4.5 percent.⁷

Although the lag on this data means it only relates to the early period of project delivery, this indicates that as the project was beginning delivery, the challenges around low investment in research and innovation in the LEP area remained a key issue.

3.2 National and Regional Policy

Following the COVID-19 pandemic, the UK Government's Build Back Better: our plan for growth⁸ sets out the way it plans to support economic growth through investment in infrastructure, skills, and innovation. It aims to increase the number of businesses translating new ideas into new products and services through improving the innovation ecosystem.

⁴ Source: UK Innovation Survey 2019

⁵ Ibid

⁶ Source: ONS Expenditure on R&D, by sector of performance and NUTS 2 region, 2017

⁷ Source: ONS Interdepartmental Business Register

⁸ See: <https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth>

The UK Industrial Strategy⁹ sets out four grand challenges to put the UK at the forefront of the industries of the future, the third of which is particularly relevant to this project:

- Artificial Intelligence and data
- Ageing society
- Clean growth
- Future of mobility

Furthermore, since the outset of the project, there has been increasing focus nationally on investment in clean energy and energy networks, including through the Government's 10 Point Plan for a green industrial revolution (November 2020), which has further increased the national significance of this demonstrator.

At a more local level, all LEPs were required to develop a Local Industrial Strategy (LIS), long term plans that build on local strength to ensure the communities reach their economic potential. The LIS aims to support local businesses to grow and develop, increase productivity and innovation and higher-level skills. The SSLEP industrial strategy is built on four broad themes:

- Future Workforce
- Growing Business
- Innovation
- Place

The innovation theme seeks to develop world class innovation and increase demand and capacity for innovation across the business base. The SEND infrastructure is also recognised in the LIS as a key economic asset in the area's ambitions for growth in the low carbon sector.

The activities undertaken by the SEND project align well with both regional and national industrial strategies. The capital infrastructure provides a highly value national demonstrator facility, whilst the revenue projects aim to maximise the economic value of the infrastructure through supporting development of knowledge transfer and promoting investment in RD&I by SMEs.

3.3 COVID-19

The most significant changes in economic conditions since the project commenced have come as a result of the COVID-19 pandemic. This has had a significant impact on the UK economy and regionally in the SSLEP. Over the course of 2020, GDP nationally declined by 9.8 percent and during the first lockdown in April 2020, GDP was 25 percent lower than it was two months earlier in February.¹⁰ Although smaller, the second lockdown in January 2021 saw a further decline in GDP of 2.5 percent.¹¹

⁹ See: <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges>

¹⁰ Source: ONS Gross Domestic Product Year on Year Growth

¹¹ Ibid

More recently, there are positive signs that the economy is recovering well. UK GDP is estimated to have grown for a fifth consecutive month in June 2021, by 1 percent, but remains 2.2 percent below its pre-pandemic level.¹²

With large parts of the economy closed for extended periods, the pandemic also affected the labour market with decreases in the number of payrolled employees, and the employment rate nationally.¹³ The latest data show the labour market has recovered well and the number of payrolled employees in the West Midlands region is now above pre-pandemic levels and unemployment continues to fall.¹⁴

At a project level, Covid-19 affected:

- **Marketing activity** – much of which was previously undertaken face to face at events, which were no longer going ahead after Covid-19 lockdowns
- **Capital activity** – although most of the significant work had been completed before the impacts of Covid-19, it did cause delays to the final elements, including the installation of smart meters into people's homes on campus
- **RD&I support** – a number of research projects were delayed as researchers were unable to get into businesses to continue their work – a number of these have sought extensions to delivery as a result
- **Supply chain support** – the business support provided by Stopford Environmental had to be moved to online delivery, however the disruption from this was not too significant
- **Businesses may have been less likely to seek support** in some cases due to the need to respond to additional challenges in their business affected by the pandemic and associated economic disruption.

3.4 Britain's Exit from the European Union

The European Union (EU) referendum in 2016 and the following period until the UK's formal withdrawal from the EU on 31st December 2020 contributed to uncertainty amongst businesses. This was the case throughout the negotiation where the terms of the Withdrawal Agreement were unagreed and unclear for long periods.

This contributed to a climate of uncertainty for businesses and some consultees indicated it may have affected the numbers of enquiries from businesses open to engage with an EU funded project. This was mainly down to misunderstanding but meant additional time was required to engage those businesses and explain that the project was still relevant and would continue.

¹² Source: ONS Gross Domestic Product monthly estimate

¹³ Source: ONS Labour Force Survey

¹⁴ Source: ONS Labour Market Overview: September 2021

3.5 Summary

Change	Description	Impact on Project Rationale	Rating
Innovation Expenditure	Expenditure on Research Development and Innovation in the Shropshire and Staffordshire region are amongst the lowest in the UK	Demonstrates continuing need for investment in RD&I support programme	Positive
National and Local Innovation Policy	Increased priority placed on innovation seen at national and local level and increased focus on investment in clean energy and energy networks in national policy and within the Local Industrial Strategy	Reinforces the strategic national and local importance of the SEND project	Positive
Covid-19	COVID-19 has had a significant impact on the UK economy, labour market and socio-economic context in which SIH is being delivered	Impact on ability of the project to engage new businesses via face to face engagement	Negative
		Challenging economic conditions impacting on business' planning horizons making some businesses less likely to access support during this period	Negative
		Some delays / disruption to each element of project delivery	Negative
Brexit	Brexit negotiations and changes to importing and exporting processes have created an uncertain economic climate for businesses	Uncertainty of businesses around the continued relevance and delivery of the SEND project, given it is EU funded, which may have affected project take-up.	Negative

4 Financial and Output Performance

This chapter provides a summary of the SEND project's financial and key output performance against targets.

4.1 Performance Against Contractual ERDF Targets

An overview and assessment of SEND's contracted output and expenditure targets against the project's performance to date, is displayed in the table below. An analysis of financial and output performance follows this below.

Indicator	Targets		Performance at time of evaluation		Projected performance at project closure		Overall assessment
	Original	Adjusted (if relevant)	No.	% of target	No.	% of target	
Capital expenditure (£m)	£8,868,018	£8,868,016	£8,447,144.37	95%	£8,868,015.69	100%	
Revenue Expenditure (£m)	£6,312,096	£7,763,454	£5,224,471.24	67%	£7,763,453.24	100%	
Number of enterprises receiving support	243	263	232	88%	264	100%	
Number of enterprises receiving non-financial support	243	263	232	88%	264	100%	
Number of new enterprises supported	9	18	18	100%	18	100%	
Number of enterprises cooperating with research entities	26	61	9	15%	61	100%	
Number of enterprises supported to introduce new to the firm products	7	17	1	6%	16	94%	
Estimated annual decrease of GHG (tonnes CO2e)	4096	4523	0	0%	4096	91%	

4.1.1 Financial Performance Against Original Profile

Overall, the project is largely on track with its spend profile, with the capital expenditure for the project almost completed and more than two thirds of the revenue funding defrayed.

The fifth PCR for the project extended delivery until 2023, so the revised costings will cover the continuation of the revenue elements of the funding until that stage. The team remain confident that the full project funding will be defrayed.

4.1.2 Output and Result Performance

The output and result indicator performance is currently very positive, with almost 90 percent of the enterprises assisted target achieved already. Number of enterprises cooperating with research entities appears low at present as many of the related business assists are part of 3-year long support projects, and so have not yet been signed off – however the move towards allowing 3-month long RD&I collaboration support will help to increase this going forward. The position is similar for the target around new-to-firm products and greenhouse gas reductions – both of which are tied to the longer term research projects.

Despite appearing low at this stage, the team remain confident that these targets will be achieved over the lifetime of the project, and are closely monitored through the project's governance groups, on a regular basis.

5 Project Delivery and Management

This section assesses the effectiveness of the delivery and management of SEND, drawing on evidence from a range of sources including:

- **Project performance data and background information** collected by Keele University
- Consultations with the **project delivery team and wider stakeholders** – for a list of consultees see Appendix A
- Responses to an **online beneficiary survey**, sent to all beneficiaries that received support from the project.

5.1 Marketing and Engagement with Beneficiaries and Take-up

Marketing and promotion of the SEND project has been undertaken by a range of means, including direct contact, face to face engagement at events, information found online and referrals from other providers.

Consultations with delivery partners highlighted that:

- **Face to face engagement** had been a key route to engaging potential beneficiaries (as reflected in the chart below), and was a challenge to the project when face to face events typically stopped following the outbreak of Covid-19 and subsequent periods of lockdown and requirement for social distancing.
- **Referrals** were also a key route for businesses into the project, again reflected in the chart below; note: two of those listed as 'other' were referrals from the Staffordshire Business and Environment Network, (SBEN).

One of the consultees engaged in the evaluation particularly noted the challenge faced in communicating the offer of the SEND infrastructure, and by association of the business support packages that sit alongside this. They noted the complexity of smart energy systems, and felt more work to help explain what the infrastructure is and does, and how it could be beneficial to support business innovation would be particularly beneficial, noting that case studies showcasing examples of supported businesses could also be helpful.

Consultees highlighted a number of particular challenges in terms of reaching the ideal types of business seeking support:

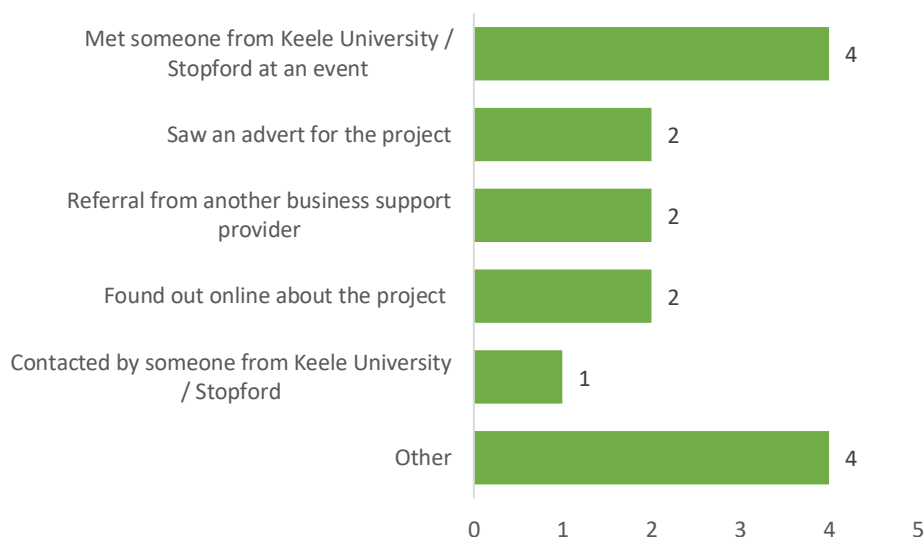
- Firstly, the fact that the university is based at the northern end of the LEP geographical area meant that it could be more difficult engaging businesses from the southern end of the LEP area, whereas businesses that were much closer but outside the LEP area could not be engaged
- Secondly, it was highlighted that it had been more challenging engaging the smart energy technology sector, where RD&I collaboration support might have greatest impact – it was

highlighted that the businesses supported were typically adopters rather than initiators of new products and processes

- Thirdly, consultees highlighted that a substantial number of supported businesses received support that was not directly linked to the presence of the SEND infrastructure. Although not a problem in itself, this does potentially mean that the project did not exploit the benefit of the infrastructure investment as much as it could have to support local economic growth.

A number of consultees highlighted that enabling a wider reach of potential SMEs (beyond the constraints of the Stoke & Staffordshire LEP geography) could have helped the project to reach a larger range of potential beneficiaries and potentially identified businesses which were better suited to engage with this project with respect to supporting new product / service development and making use of the SEND facility.

Figure 5.1: How businesses first heard about SEND



Source: Beneficiary Survey n=15

5.2 Take-up and Prioritisation

The table below provides a breakdown of business size and age data from beneficiaries which have either completed support or are underway. Not all data was captured for all businesses, however sufficient data was available in order to draw out an understanding of the composition of supported businesses.

Table 5.1: Summary of the Characteristics of Supported Businesses

	RD&I Collaboration Support		Supply Chain Development Support	
	Number	% of total	Number	% of total
Business Size (employees)				
Micro (0-10 employees)	21	62%	159	78%
Small (11-50 employees)	9	26%	35	17%
Medium (51-250 employees)	4	12%	9	4%
Total	34	100%	203	100%
Business Age (Years)				
0-5 years	9	26%	80	38%
6-10 years	8	23%	50	24%
11-15 years	5	14%	22	11%
16-20 years	4	11%	23	11%
Over 20 years	9	26%	33	16%
Total	35	100%	208	100%

Source: SEND Beneficiary Data. Note: figures may not sum to 100% due to rounding.

As might be expected, the RD&I collaborative support project has attracted and engaged slightly more mature businesses, with only around one quarter of these businesses being less than five years old, and over a third having more than 10 employees (only around a quarter of all businesses supported had fewer than five employees). Data on sectors of supported businesses is limited in the data, but suggests the largest concentrations of supported businesses were in professional, scientific & technical; and information and communications sector groups.

By contrast, the supply chain development support programme did have more of a focus on smaller and younger businesses, with 78% of businesses of micro size, and the majority of these being smaller than five employees. Similarly, just under 40% of the businesses are below five years old and over 60% are below ten years old.

Overall, subject to the limitations highlighted above, around being limited to supporting SMEs within the LEP area, the project's approach to engaging SMEs and checking eligibility, appears to have supported a good range of businesses of different sizes and ages, with the RD&I support focused on slightly larger and more established firms, as might be expected.

5.3 Identification of Support Needs

The process for identifying the support needs of businesses engaged involved initial meetings with businesses (initially face to face, but moving to online following the outbreak of Covid-19), understanding the issues facing the company, considering alignment to the SEND project objectives, defining the support project, and identifying resources to provide that support (whether from within the University or looking externally). This process culminated in a beneficiary agreement, covering all of the required paperwork for the fund.

Consultees indicated that this process had worked well, although highlighted that the main challenges that arose around this related to the RD&I collaboration support:

- One challenge was the early recognition that there was limited demand for 3-year long support projects – with SMEs highlighting it was challenging from their side to commit to engagement on a project over such a long period. In response to this, the project adapted to introduce an alternative 3-month long support projects, which better suited the needs and preferred engagement timescales of many SMEs
- A second challenge was in the breadth of academics that the project was successfully able to draw on to support businesses. Some consultees highlighted one issue was that Keele doesn't have an engineering department, and much of the immediate demand linked to SEND was for engineering support. Others highlighted that opportunities may have been missed to better integrate a wider set of academic teams with the project offer, for example promoting the role social science researchers can play in helping SMEs to better understand the perspectives of users around new technologies, which can be key to commercial success.

5.4 Business Support Activities and Satisfaction

5.4.1 Infrastructure Investment

The £8.9m capital investment in the SEND infrastructure has been completed to budget and with only a small timing delay for final elements. While much of the installation occurred before the impacts of Covid-19, some of the later elements including installation of smart meters in domestic properties on campus was delayed as it became more difficult for installers to go into people's homes due to restrictions linked to Covid-19.

Consultees were very positive about the quality of the infrastructure installed, feeling that the investment had met its range of objectives, and gone further than originally envisaged. In part this was down to the phased delivery approach employed by the contractor (Siemens), which allowed for each phase of infrastructure installation to be reviewed on completion and a refresh of the next phase plan, taking account of any new technologies developed being undertaken – reducing the risk of the installed technology becoming redundant. One of the key areas of added value highlighted was the introduction of a control centre in the Horwood Energy Centre, which provides a visible presentation of the system, helping to increase engagement with and understanding of the project.

5.4.2 Revenue Programmes

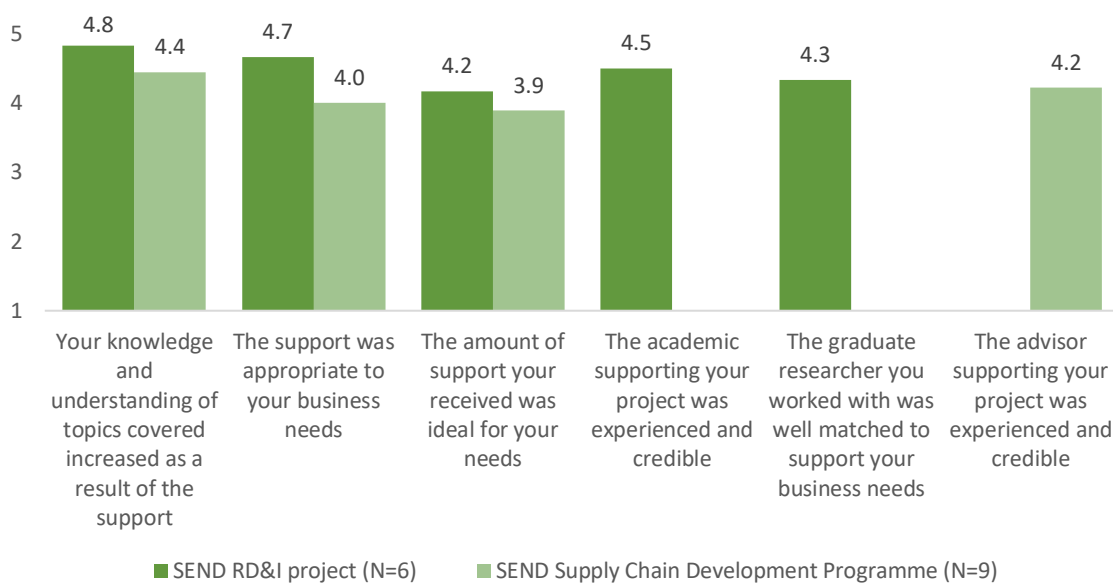
The revenue activity was supported under two main programme types, as originally anticipated in project design. This included:

- **RD&I collaboration programme** – this was originally set up to provide 3-year support projects, working with a researcher undertaking a PhD. Due to limited demand from SMEs for this length of support however, a shorter 3-month RD&I collaborative support project was added as an alternative offer

- **Supply chain development support programme** – this largely ran as originally intended, with delivery sub-contracted to consultants Stopford Environmental, which delivered tailored business support with a minimum of 12 hours’ support provided.

The chart below highlights very positive overall ratings for both the RD&I collaboration support and the supply chain development support programmes.

Figure 5.2 Average scores for the question “On a scale of 1 to 5 (where 1 is ‘Strongly Disagree’ and 5 is ‘Strongly Agree’), to what extent do you agree or disagree with the following statements about the support you received”?



Source: Beneficiary Survey

For the RD&I collaboration support:

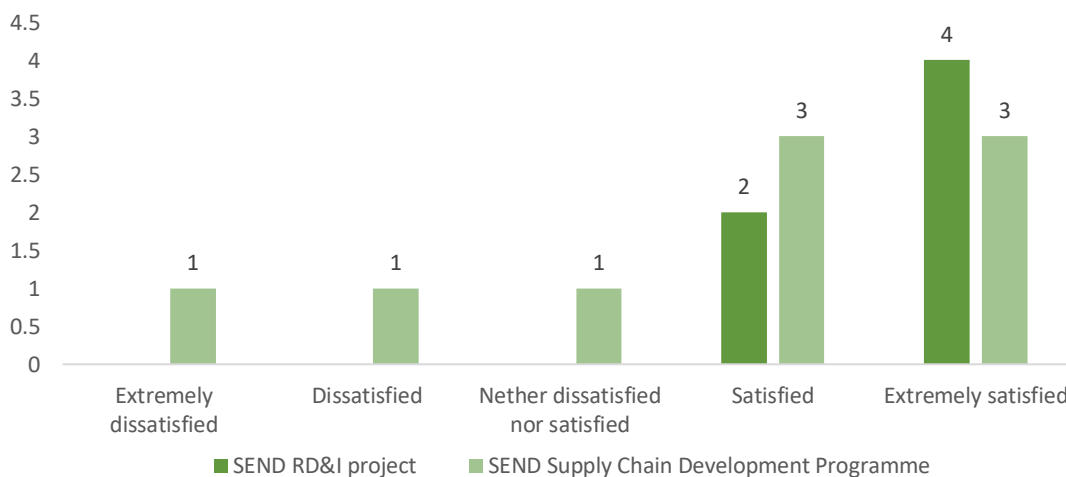
- Respondents indicated strongly positive comments that their knowledge and understanding of topics increased following support, that the support was appropriate to their needs and that the academic supporting the project was experienced and credible
- Respondents were also supportive, but slightly less so, of the statements regarding the graduate researcher being well matched to support their needs and that the amount of support was ideal for their needs
- In follow-up comments, beneficiaries highlighted that the support gave ideas and room to think of new ideas, and highlighted that the Keele team had been very hands-on and accessible throughout project delivery – supporting project success.

For the supply chain development programme support:

- Ratings for each statement were slightly lower than for the RD&I collaborative support programme
- Nevertheless, responses overall were very positive for statements on knowledge and understanding of topics increasing as a result of support and that the advisor supporting the project was experienced and credible
- Responses were also overall positive, but slightly less so on statements around the support being appropriate for your business needs and the amount of support being ideal for your needs
- In follow-up comments, some respondents highlighted that the support was well tailored to their needs and led to particularly useful new tools to support their objectives. Where less well received, some respondents noted that the advisor had not really understood their needs sufficiently, or that the output received was too generic to really help that business.

Figure 5.3 below highlights overall satisfaction with the two programmes, which largely reflect the findings above, with all RD&I support beneficiaries stating they were satisfied or extremely satisfied with the support, and a slightly more mixed response on the supply chain development programme, albeit with two thirds still stating they were satisfied or extremely satisfied.

Figure 5.3: Overall, how satisfied are you with the support you received through the SEND programme? (All responses)



Source: Beneficiary Survey n = 15

A final point to note, identified by a number of consultees, is that the connection between the capital and revenue elements of the project were not as strong as they might have been.

- In part this was due to the fact that because of the timescales for ERDF project delivery, the two elements needed to run concurrently – hence much of the infrastructure was not installed at the time the revenue funded projects were underway
- In addition to this, there is an ongoing challenge, as highlighted earlier, that smart energy networks are a complex topic and it can be difficult to communicate what the facility is, and what it does – and that further work may be needed to more clearly communicate this to businesses in order to increase their demand to engage with the facility to support them to develop new products and services.

5.5 Management and Governance

SEND has been managed and overseen by a number of governance groups. The early part of project delivery was overseen by the Project Executive Group (PEG) which was chaired by the University's Deputy Vice Chancellor. The PEG is responsible for larger projects delivered by the university including major capital projects such as SEND. Once the capital aspect of SEND was largely completed, this reverted to the Project Monitoring Board who are responsible for holding the operational team to account for performance against contracted outcomes.

The day-to-day management and decision making is carried out by the Project Operational Group which consists of key SEND delivery partners. Management staff indicated that the structures work well, albeit it was suggested that the multiple layers can cause delays at certain points, such as when new staff recruitment is required – something that was a challenge for the SEND project, where there have been four project managers for the project over the course of delivery, with three having left post during the delivery period.

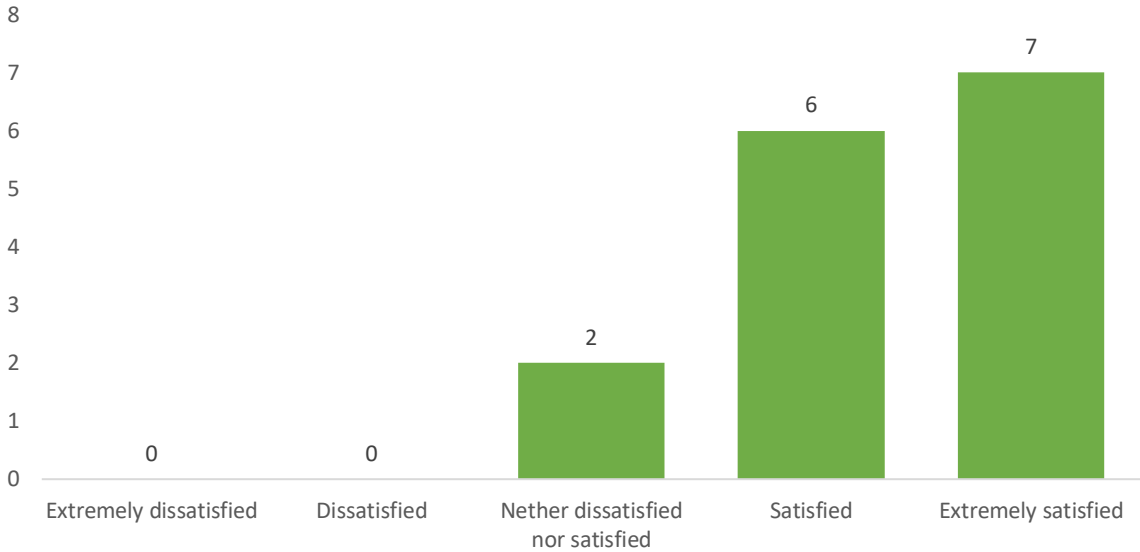
The change in project managers was felt by some to have caused some disruption in the early stages of delivery, however the current project manager has now been in post for nearly a year and has helped ensure stability for the project over the more recent delivery period.

Delivery staff indicated that the management structures have been particularly effective in overseeing and monitoring performance indicators, helping to ensure the project remained strongly on track with delivery.

One issue raised by some consultees was that some of the academic partners could have been engaged better and earlier in the process. One consultee indicated that a separate research group might usefully have been established to bring together key academic teams with the leads on the infrastructure to better develop the way that the research activity could best exploit the high quality infrastructure installed.

Beneficiary businesses indicated that overall the administration and delivery of the SEND project had been positive, as shown in Figure 5.4, and no particular issues were raised in this regard.

Figure 5.4 How satisfied were you with the administration and delivery of business support? (overall)



Source: Beneficiary Survey n=15

6 Early Project Outcomes and Impacts

Section 6 sets out early evidence of the project's outcomes and impacts, drawing on evidence gathered from:

- Consultations with the **project delivery team and wider stakeholders** – for a list of consultees see Appendix A
- Responses to an **online beneficiary survey**, sent to all beneficiaries that received support from the project
- **Case study** consultations undertaken with a selection of supported businesses.

6.1 Achievement of Business Outcomes

The business support delivered under SEND aims to raise the level of research and innovation amongst SMEs in the Stoke and Staffordshire area by reducing businesses' risk and barriers to innovation and growth. To evaluate this, it is important to understand the way that businesses' barriers have been overcome and how that has led to outcomes and impacts.

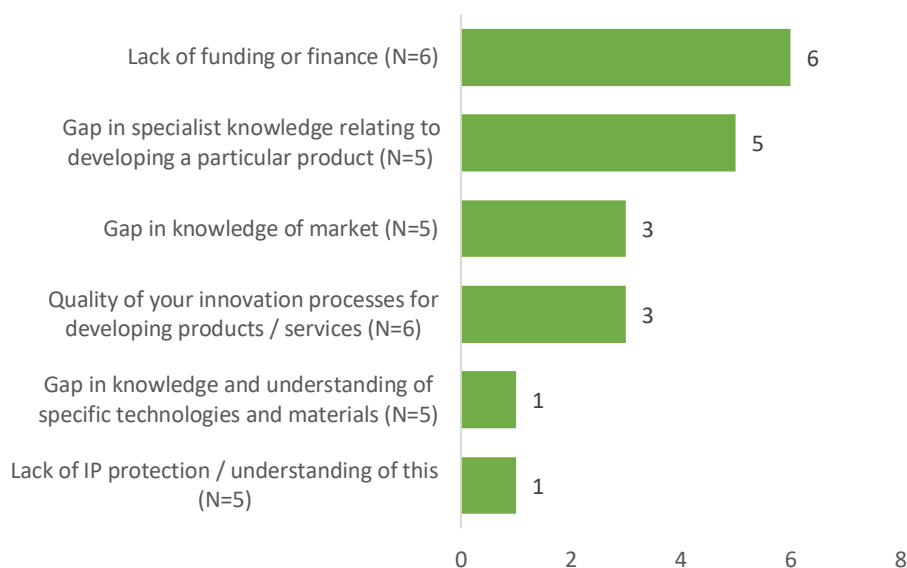
6.1.1 Overcoming Barriers to Growth

[SEND RD&I collaborative support project](#)

As Figure 6.1 shows, the most significant barriers to growth¹⁵ for survey respondents were lack of funding or finance, and gaps in specialist knowledge around developing a product; the least common barriers were around IP protection and understanding of this and gaps in understanding of specific technologies and materials. All businesses responding to the survey identified at least one of the below as a significant barrier suggesting their suitability for the SEND support.

¹⁵ Note: A significant barrier is defined by a respondent scoring that barrier a four or five out of five in terms of significance of that barrier to their business.

Figure 6.1 Number of supported businesses identifying each factor as a significant barrier to growth (SEND RD&I support programme)



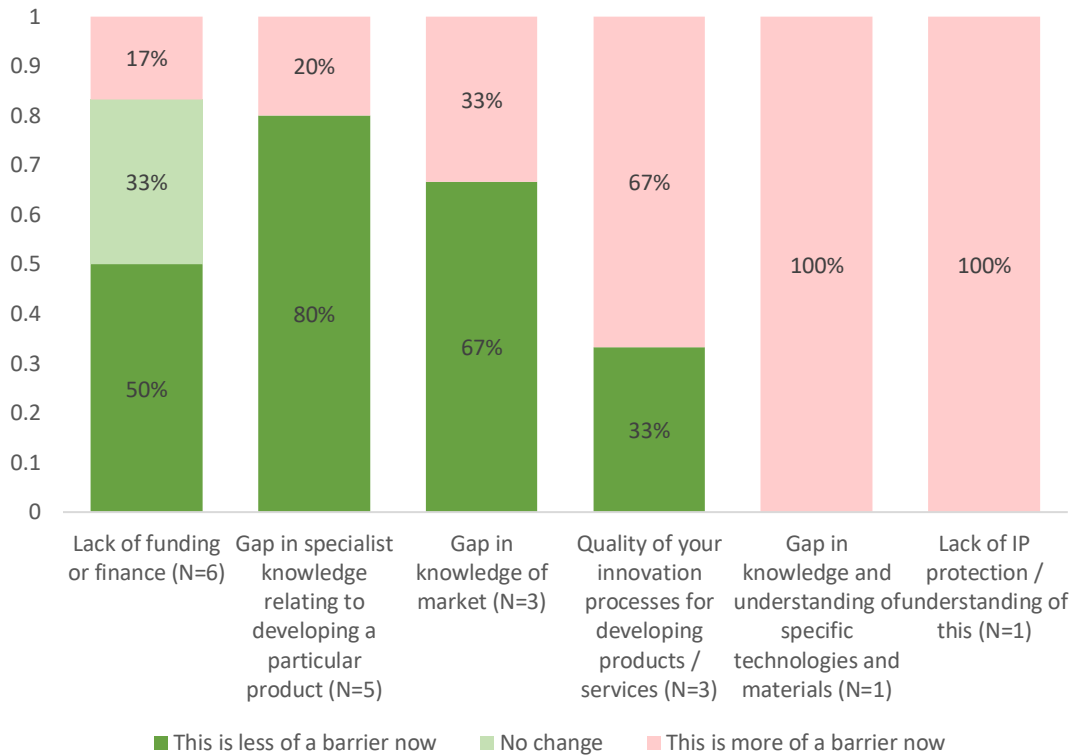
Source: Beneficiary Survey

Figure 6.2, shows the progress that has been made in SMEs overcoming these barriers. SMEs that identified a significant barrier were asked to indicate whether this had become more or less of a barrier since working with the SEND RD&I Collaborative support project. It shows that most progress has been made against businesses that had a gap in specialist knowledge relating to product development or gap in knowledge of market. For each of these barriers, at least half of SMEs that identified it as a significant barrier indicated that it was now less of a barrier, following the support received.

Less progress had been made against barriers around lack of IP protection / understanding of this and gaps in understanding of specific technologies and materials, with businesses indicating that there was no improvement against these barriers. This perhaps reflects that these areas are less of a core offering of the SEND RD&I support programme. It does, however, highlight the importance of the programme being part of a wider suite of business support available across the SSLEP region.

Four of the six businesses that indicated they were experiencing a significant barrier to growth had made progress against one or more of their barriers following the SEND support. Each of these four SMEs said that the SEND support had played some role in the progress.

Figure 6.2 Please indicate for each of these whether this is more or less of a barrier to growth now, since you began working with the SEND (RD&I support) programme

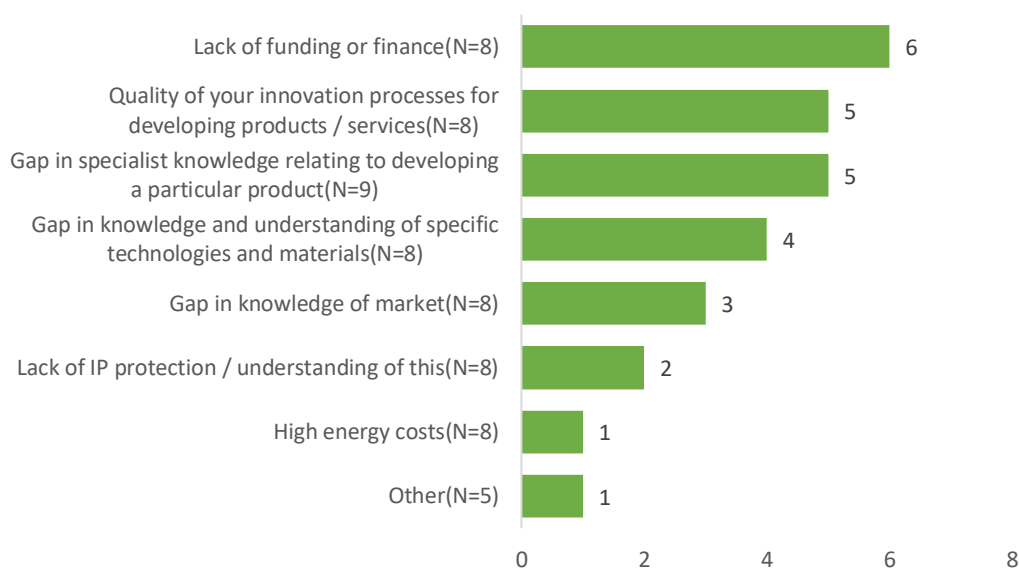


Source: Beneficiary Survey

SEND Supply Chain Development Programme

Figure 6.3 shows the barriers that SMEs highlighted as most significant prior to accessing the supply chain development programme.

Figure 6.3 Number of supported businesses identifying each factor as a significant barrier to growth (SEND Supply Chain Development Programme)



Source: Beneficiary Survey

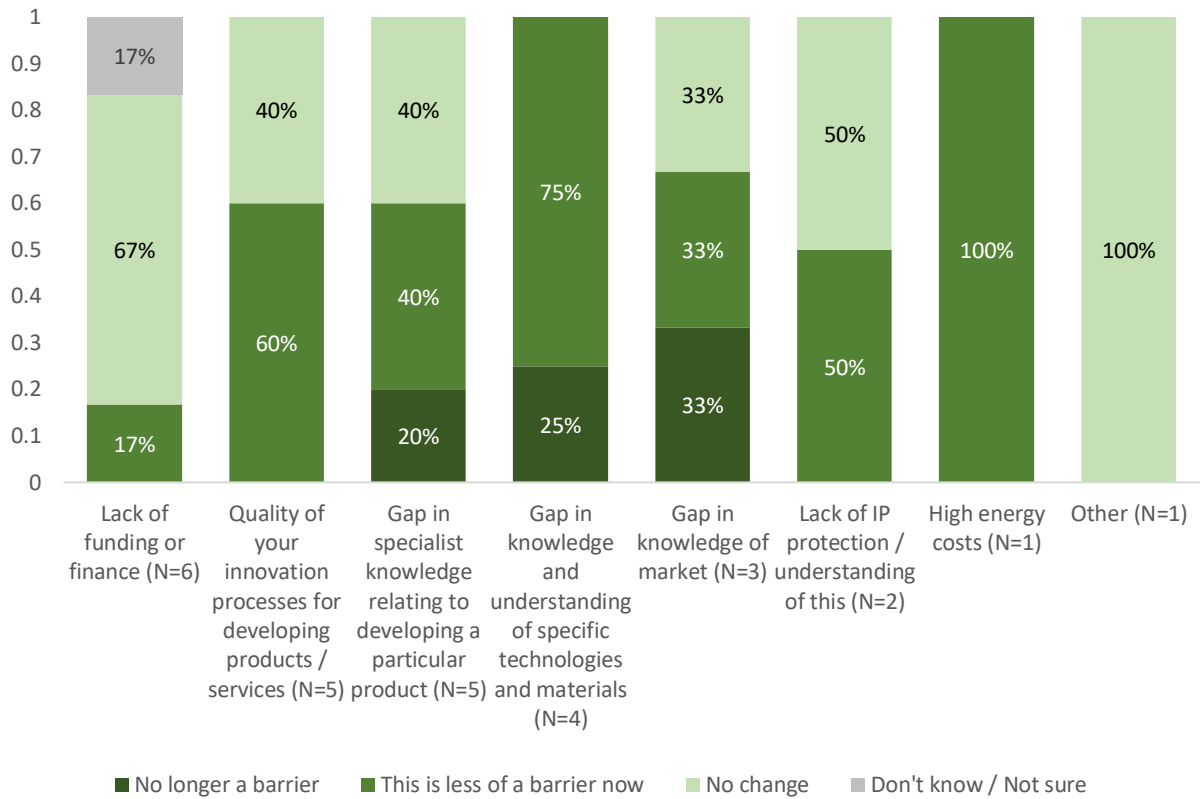
The most significant barriers to growth for survey respondents were: lack of funding or finance, gaps in specialist knowledge around developing a product, and quality of innovation processes. The least common barriers were around high energy costs, IP protection and understanding of this, and gaps in understanding of the market. All businesses responding to the survey identified at least one of the barriers as a significant barrier suggesting their suitability for the SEND support.

Figure 6.4, shows the progress that has been made in SMEs overcoming these barriers. It shows that most progress has been made against gap in specialist knowledge relating to product development, gap in knowledge of specific technologies and materials, quality of innovation processes, and gap in knowledge of market. For each of these barriers, at least half of SMEs that identified it as a significant barrier indicated that it was now less of a barrier, following the support received.

Less progress had been made against barriers around lack of funding and finance, with most businesses indicating that this was still as much of a barrier now as at the project outset. This perhaps reflects that this area is less of a core offering of the SEND supply chain development support programme. As above though, this does highlight the importance of the programme being part of a wider suite of business support available across the SSLEP region.

Six of the nine businesses that indicated they were experiencing a significant barrier to growth had made progress against one or more of their barriers following the SEND supply chain development support. Each of these six SMEs said that the SEND support had played some role in the progress.

Figure 6.4 Please indicate for each of these whether this is more or less of a barrier to growth now, since you began working with the SEND (supply chain development) programme

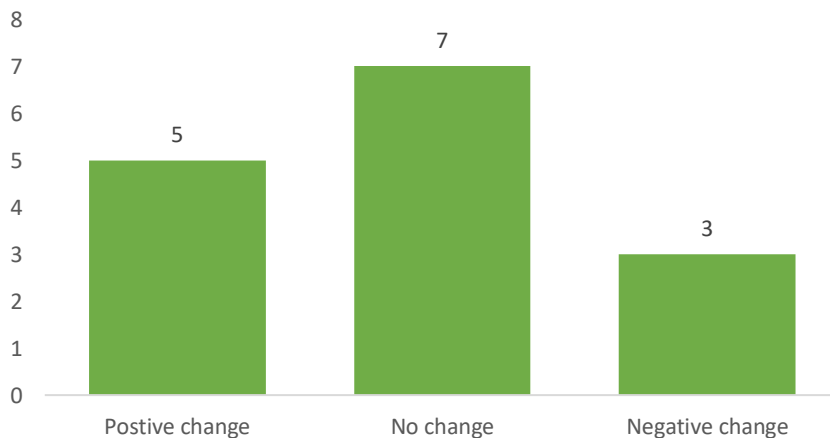


Source: Beneficiary Survey

6.1.2 Impact on Employment

Figure 6.5, below, shows the changes to employment levels seen in SMEs since accessing the SEND support. It shows positive changes have already occurred in five of the 15 supported SMEs to date. No SMEs indicated they had safeguarded job as a result of the support received.

Figure 6.5 Change in employment levels in the last 12 months



Source: Beneficiary Survey n=15

SMEs were asked to indicate the extent to which these increases in employment were attributable to the SEND project and three of the five felt the increase to date was at least partially due to the SEND project.

Often increases in employment can take time to occur and seven SMEs said they expected to see an increase in employment over the next twelve months. Of these, six indicated this expected increase was related to the support received through SEND in some way.

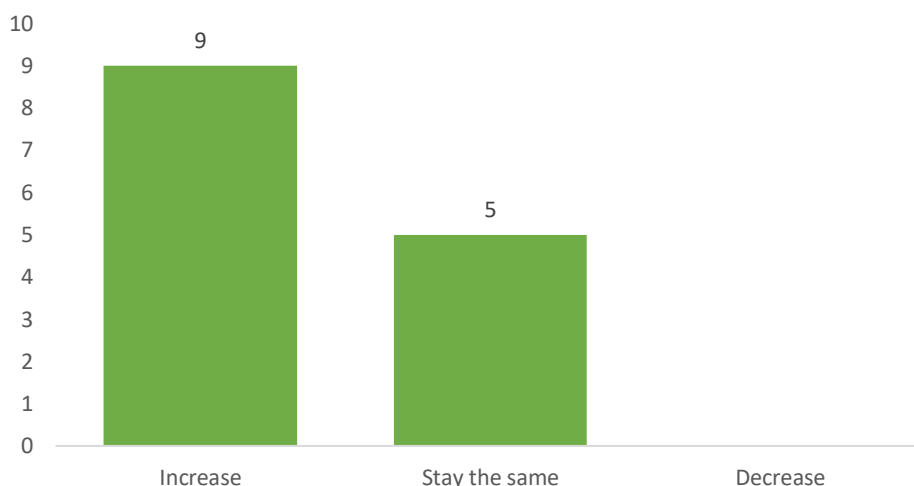
Of the six SMEs expecting to see an increase in employment attributable to the project, four were from the RD&I support (two thirds of the respondents from this strand), while three were from the supply chain development support (one third of the respondents from this strand).

Given the more intensive support provided under the RD&I support strand, it is not surprising that a larger proportion of beneficiaries from this strand suggested they expected to see employment growth that is partly attributable to the support received.

Impact on Turnover

Nine SMEs indicated that they had seen an increase in their turnover since accessing the SEND support and eight of these felt that the change was at least partly attributable to the SEND project.

Figure 6.6 Changes to Turnover in the last 12 months



Source: Beneficiary Survey n=6

Over the next twelve months, ten SMEs indicated that they expected their turnover to increase and, of these, six indicated that this expected increase was at least in part related to the support received through the SEND project.

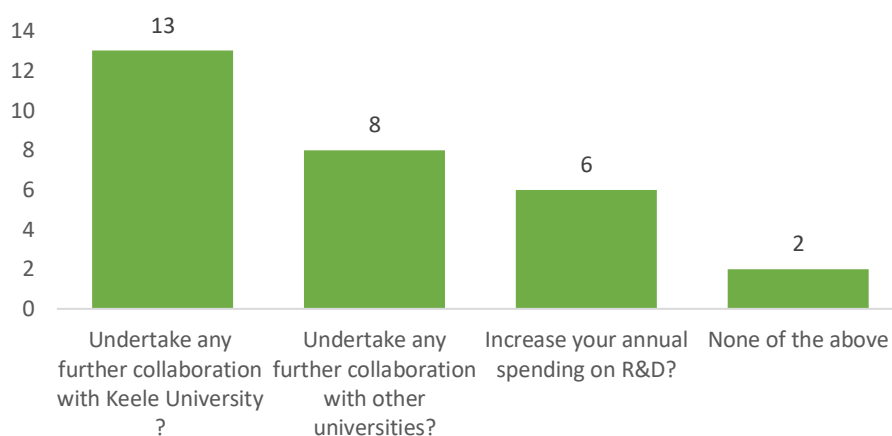
Of the six SMEs expecting to see an increase in turnover attributable to the project, three were from the RD&I support (half of the respondents from this strand), while three were from the supply chain development support (one third of the respondents from this strand).

As above, given the more intensive support provided under the RD&I support strand, it is not surprising that a larger proportion of beneficiaries from this strand suggested they expected to see turnover growth that is partly attributable to the support received.

6.2 Wider Project Outcomes

In addition to overcoming barrier to growth and emerging impacts on employment and turnover, progress can be seen in SMEs' aspirations for follow up activity following the support received, notably with 13 out of 15 respondents indicating that they would be interested in undertaking further collaboration with Keele University.

Figure 6.7 Following the support received from the SEND do you plan to:



Source: Beneficiary Survey n=15

More broadly, the strategic nature of the SEND project has attracted substantial national attention, and contributed to a wide range of additional project outcomes. These include the following:

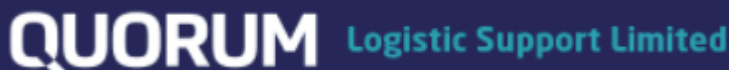
- The SEND investment is recognised as a **core asset in the SSLEP local industrial strategy**, underpinning aspirations for growth of the low carbon sector and helping to attract further investment in this sector and drive local growth and job creation
- The facility has already acted as a **demonstrator to a range of larger organisations** looking to invest in their own smart energy network infrastructure, with high profile visits from Audi and Birmingham Airport having taken place
- £3m funding from Innovate UK has been secured for **funding for a Zero Carbon Rugeley project**, linked to the success of the team involved in the SEND project. This project involves developing an innovative design for a town-wide smart local energy system including the former Rugeley Power Station site.

- Keele University was named the **global sustainable institution of the year in 2021** at the International Green Gown Awards, which celebrate sustainability in higher education. The SEND project was a core part of the package of green interventions by the university contributing to gaining this accolade
- Linked to the above, the strong green credentials that Keele has, partly underpinned by the SEND investment, was recognised by consultees as contributing to making the university **more attractive to students**, supporting recruitment aims
- The SEND infrastructure is Europe's largest at scale smart energy network demonstrator, and as such has attracted attention from stakeholders nationally and internationally, strengthening the university's credentials and creating **new network opportunities**
- Some consultees noted that this benefit could be further exploited by stronger focus on attracting more research funding that builds on the presence of the SEND facility. Only relatively minor research funding from the EPSRC and other parts of UKRI having been attracted to date
- **Reduction in carbon emissions** from the university as a result of the enhanced infrastructure
- Providing a foundation for the university to press onwards with longer term plans for **development of a smart campus**, which could incorporate aspects such as further integration of lighting and heating automated with room bookings, and moving towards smarter transport connectivity
- At an intervention level, some consultees also noted that individual researchers appointed to work with companies on SEND-backed projects have gone on to **secure employment within those companies**, supporting additional local job benefits for those researchers.

6.3 Case Studies

Quorum Logistic Support Ltd – Supply Chain Development Programme

Quorum Logistic Support Ltd offers engineering project management and support to businesses in

The logo for Quorum Logistic Support Limited features the word "QUORUM" in a large, bold, white sans-serif font on a dark blue background. To its right, the words "Logistic Support Limited" are written in a smaller, teal-colored sans-serif font.

various sectors, notably defence but are also looking to provide more engineering support and solutions in the renewable energy sector. The business was started in September 2000 and currently employs 10 people.

The business had previously engaged with Keele University and approached the SEND project to try to gain a better understanding of the renewable energy sector in order to offer support in this area.

“The objectives were to make ourselves a prominent company in the renewable energy sector so we wanted support in this area.”

As part of their 12 hours of support, the business worked with an organisation who were able to advise them on safety issues they may face whilst working in the renewable energy sector contributing to Quorum Logistic Support Ltd’s goal of setting up a credible evidence framework to show their competence to work in the renewable energy sector. As a result of meeting various stakeholders working on renewable energy sources they were able to produce a white paper for potential clients.

Quorum Logistic Support Ltd felt that the support they received had been extremely helpful and informative:

“It all worked well but the 12 hours of working with Stopford was a real eye opener and the value of that was immense. The greatest value of that was realising there were some gaps in our business model we needed to plug. The whole organisation and contact we had with Keele was excellent.”

As a result of the support, the business now feels confident that they can effectively market themselves in the renewable energy sector and demonstrate activities they have undertaken. Their experience with the programme also led Quorum Logistic Support Ltd to implement environmental meetings within the company to manage their sustainability & environmental impact.

The business is still in the process of establishing themselves in the renewable energy sector and, whilst they accept that they are still developing their levels of expertise, have been able to tender for work and make good inroads into this field.

Looking to the future, Quorum Logistic Support Ltd are keen to collaborate further with Keele University to strengthen their credibility working in the renewable energy sector.

Astec IT Ltd – RD&I Programme Support

Astec IT Ltd develops software solutions used in industry and manufacturing to maximise productivity by predicting future maintenance needs and potential downtimes allowing their clients to pre-empt and respond to these needs. The business started in August 2000 and employs 25 staff including 4 freelancers.

Initially approached by Keele University, the company identified the SEND project as an opportunity to grow their business by developing products and/or services linked to the project.

“...we could use SEND as a test bed to take products to market and it seemed like a low cost entry into supporting an academic to study for their PhD with us.”

Another motivation for Astec IT Ltd was the fact that a business they were in partnership with had also identified the SEND programme as a means of diversifying their offer. Together, the two businesses felt there was a potential to develop a suite of products to monitor things like electricity usage, water flow rates and flow meters and planned to use Keele University campus as a ‘micro city’ to develop and test their platform.

Unfortunately, the platform was ultimately discontinued although Astec IT Ltd stressed that this was in no way a reflection on the support they received from Keele University.

Despite the discontinuation of their original product concept, Astec IT Ltd were positive about the support they received and are still in contact with Keele University who continue to provide the business with information about potential opportunities, programmes and networking events. The university has provided some marketing to promote the business and Astec IT Ltd ensure they reference their involvement with the SEND project in conversations with customers in the energy sector.

The business is keen to collaborate on a similar idea to one which they first engaged with the SEND project for:

“I think it's a great programme, what they have and what they will develop is really good. I think for us, it was just unfortunate timing we've not been able to make maximum use of SEND... They have done a great job with what we started out to achieve and they continue to support the academic with us.”

Power Technologies Ltd – RD&I Project Support

Power Technologies Ltd work in power transmission & distribution. Established in 2014 the business provides consultancy on power grids, smart grids & energy networks. Although the business only employs two people, they use additional contractors as and when required (e.g. when they secure larger contracts).

The business was looking to develop specific systems related to the smart grid and energy management, and came across the SEND project whilst looking for a project which would enable a researcher who was being supported by the business to undertake a PhD. They were attracted to the project as:

“Keele provided a model for working with local SME's to develop the product as well as partnering with themselves to provide academic support in the development of the product.

“The idea was we would benefit from developing algorithms and a control strategy based on electric vehicles charging regime, the effect on the electricity grid and how the grid can prioritise car charging”

Keele provided support through the provision of a funded researcher, and also facilitated a joint collaboration between the company, Huddersfield University, Lincoln University and a battery manufacturer.

Power Technologies Ltd felt that the multi-disciplinary meetings, liaison and collaboration around the project team and project management worked particularly well although they would have liked to have seen some practical implementation of the study which had been conducted rather than it being purely academic. It was acknowledged that the project was not at a stage to take forward simulation testing and the business would have liked more progress in this area. It was also suggested that it would be helpful if support was available to develop a marketing approach as well as developing the products themselves.

Thanks to the support, Power Technologies Ltd has been given further insight into their idea and the feasibility of bringing their product to market. In order to get the product live they are hoping to move forward by collaborating with local authorities.

The business feels that, as a result of the support, they will be able to develop a road map for the product as their experience has helped to shed light on other considerations they hadn't previously considered. Without the programme, they would not have been able to fund the research themselves. Power Technologies Ltd is now in collaboration with Lincoln and Huddersfield Universities and has expanded their network to include a battery manufacturer who is looking at alternative technology for battery storage. The algorithm that was developed as a result of the programme demonstrated that the project was feasible and would bring long term benefits to the business.

7 Conclusions and Recommendations

This section of the report looks to summarise the findings against the five summative assessment themes, as set out below and in the ERDF summative assessment guidance and provides recommendations for future project delivery.

7.1 Conclusions

7.1.1 Project Relevance and Consistency

With levels of RD&I in the region continuing to be low, and clean energy and energy networks having gained greater focus in national and local policy the SEND project remains very well-aligned to regional and national priorities and if anything is even more relevant and important now than when the initial ESIF application was submitted

The COVID-19 pandemic in particular has presented additional challenges to businesses and to scheme delivery within the SSLEP area, however the SEND support has responded effectively to enable scheme continuation and provided the opportunity for businesses to access support they need in order to innovate and grow against a challenging economic backdrop.

One slight mismatch in the project is that the SEND infrastructure investment is a nationally and internationally significant demonstrator facility, with potential to support low carbon sector businesses to develop products and services across the country, yet the revenue support programmes have limited the support to businesses within the SSLEP area. Widening the reach of the project to a greater business base might have provided opportunities for much greater economic impact, and should be considered in any forward strategy for the SEND facility.

7.1.2 Progress Against Contractual Targets

Despite the challenges presented by the COVID-19 pandemic in particular, the project adapted well and has remained largely on track with delivery against its contractual output targets. The businesses assisted targets in particular are well progressed with almost 90% of targets achieved already.

Other targets appear less well advanced, but largely relate to the three year research projects currently underway:

- 15 percent of enterprises collaborating with research entities have been completed – this appears low, but largely reflects that the three year assists are currently only being signed off on completion, so a large number currently underway do not currently show in this figure.
- 6 percent of enterprises supported to introduce new to firm products – as above, these outputs are primarily related to the research collaborations, many of which are not yet sufficiently advanced to have supported introduction of new to firm products, however many of these are currently underway.

- 0 percent of annual decrease of GHG – the majority of this is linked to university savings due to the new infrastructure, where savings will start to be made and recorded now the infrastructure is almost all installed; the remainder of this target is linked to savings from new products, and so will be backloaded towards the end of the project, in line with the new-to-firm products output indicator discussed above.

Overall, the delivery team remain confident that the project is on course to fully deliver on its spend and output targets, and these are closely monitored by the project's governance groups.

7.1.3 Delivery and Management Performance

Evidence from the beneficiary survey suggests that both elements of business support are being delivered to a high standard and beneficiaries are satisfied with the support they received – with overall scores slightly higher for the RD&I collaboration support. There are well established systems and processes in place and the business journey from identification of support needs to delivery of support is effective.

Despite challenges with the loss of opportunities for face to face promotion of the programme at events following the Covid-19 outbreak, the project has been very successful in recruiting businesses to be supported through a range of engagement approaches.

The limitation of only being able to recruit businesses within the SSLEP may have meant that not all businesses supported fully met the original aspiration that supported businesses should benefit from use of the SEND infrastructure. Providing support to a broader range of businesses in surrounding areas that might have benefitted more from access to the SEND facilities might have been beneficial and should be considered in any future business support activity linked to the demonstrator facility. A further ongoing challenge highlighted was the complexity of the SEND facility and developing the best way to communicate what the facility is and what it can offer to prospective beneficiaries.

More generally, one of the key issues for delivery was that the capital and revenue elements of the project had to be delivered concurrently, in order to deliver within the available funding timescales, which meant that much of the business support activity was already underway before the capital elements had been completed. As such, this would have constrained the ability of supported businesses to utilise the infrastructure as part of their business support in any case.

The capital installation part of the project was very positive, with the infrastructure having been delivered on budget, and mostly on time (albeit final elements including installation of domestic smart meters was delayed due to Covid-19 restrictions). Consultees commonly felt the infrastructure had strongly delivered against its objectives and even exceeded expectations in some aspects, such as the introduction of a control centre in the Horwood Energy Centre, providing a visible presentation of the system.

With respect to joining up the research opportunities and infrastructure installation, several consultees felt that more engagement could have taken place at an earlier stage to explore how this could optimally function. In practice, Keele not having an engineering team, and the limited engagement with some research teams e.g. social science researchers, has meant that there have been more limited collaborations with Keele academics for RD&I support than could have been the case. Further development of these linkages, as well as consideration of closer working with other university's research teams where Keele lacks an offer (eg engineering departments) could be a key part of the future strategy for utilisation of the infrastructure.

7.1.4 Outcomes, Impacts and Value for Money

There is clear evidence to indicate SMEs have overcome a wide range of barriers to growth following engagement with the SEND support and there is emerging evidence that the support has impacted positively on beneficiary businesses' turnover and employment levels. A more comprehensive appraisal of the economic impact of the project to the sub-region will be carried out during the final summative assessment phase alongside a VfM assessment.

Despite this early evidence, it is possible that the project could have had greater impact by reaching a broader set of businesses more strongly focused on clean energy product and service development and which had greater requirement for utilisation of the SEND infrastructure in developing those products / services. In part this has been constrained by the requirement only to support businesses within the SSLEP area, however other factors as discussed above include the way the university provides clear and accessible communication about the SEND infrastructure and the opportunities it presents, and the way it connects research strengths of Keele and other university teams to the needs of prospective business beneficiaries.

As a major nationally and internationally significant demonstrator project, the SEND facility has delivered a range of significant wider benefits, including:

- Being recognised as a core asset in the SSLEP local industrial strategy, underpinning aspirations for growth of the low carbon sector
- Acting as a demonstrator to a range of larger organisations looking to invest in their own smart energy network infrastructure
- Helping Keele University to the accolade of global sustainable institution of the year in 2021 at the International Green Gown Awards, which celebrate sustainability in higher education
- Reduction in carbon emissions from the university as a result of the enhanced infrastructure
- Providing a foundation for the university to press onwards with longer term plans for development of a smart campus.

7.2 Recommendations

On the basis of the evaluation work undertaken, the following recommendations are suggested for the SEND project:

To support delivery over the remainder of the current SEND project, as well as developing plans for how the infrastructure is used to support local growth beyond the currently funded project, further work should be developed to consider how the demonstrator can best be exploited for: business engagement, research opportunities and communication about smart networks:

1. **Research** – bring together relevant research teams within the university with leads on the SEND infrastructure to explore and identify key opportunities to draw in research funding that enables the university to exploit and utilise the nationally and internationally significant demonstrator facility
2. **Research** – work with relevant research teams in neighbouring universities, which have relevant strengths complementing those of Keele (eg engineering departments) to help identify collaborative opportunities for those teams to work with the Keele SEND facility and attract research funding to exploit the infrastructure
3. **Business support** – for future programmes, seek to open up accessibility for any business support programmes to businesses from beyond the LEP area, recognising that to fully exploit the demonstrator for national economic benefits, it may require working with businesses from further afield that could gain the most from working with the SEND facility to test their clean energy products and services
4. **Business support** – For those businesses already supported by the project (and additional business supported over the remainder of the programme period), review how many of these businesses directly utilised the SEND infrastructure, and for those that did, identify how these link with the opportunities indicated under the seven value packs of the infrastructure investment (outlined in Section 2 of this study), in order to identify which elements of the infrastructure have been most valuable so far, and where there are gaps. This understanding will help focus future marketing and communications work around business support
5. **Communications** – develop the messaging around what the infrastructure incorporates, how it can be used and the potential benefits for different stakeholders groups
6. **Communications** - develop opportunities to use the demonstrator for raising awareness of businesses, residents and other stakeholders about smart energy networks, in order to exploit the communication potential of the demonstrator project.

Appendix 1: Consultees

The following project stakeholders were consulted as part of the interim evaluation.

Name	Role	Organisation
Julian Read	SEND Project Manager	Keele University
Mark Dimmock	Programme Coordination Officer	Keele University
Philip Butters	Dir Estates and Development	Keele University
Prof. Zhong Fan	Prof. & Academic Dir. SEND	Keele University
Prof. Zoe Robinson	SEND Ops. & Exec Group Member	Keele University
Chris Brumby	SEND Senior Project Manager	Keele University

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01545 571711
wavehill@wavehill.com
wavehill.com

