

Summative Assessment Report

DE-CARBONISE

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Prepared By:	Paula Shaw (Academic Manager), Kat Mycock (Impact Officer), Jenny Clementson (Senior Project Manager)
Reviewed By:	Dr Amanda Baxendale, Head of Research and Innovation Services
Approved By:	Ian Bates, East Midlands Chamber, Chair of DE-Carbonise Advisory Board
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Definitions

Outputs used in this report are defined in accordance with ‘2014 to 2020 European Growth Programme – Output Indicator Definitions Guidance for the European Regional Development Fund for England, Version 6, June 2018’ as follows:

Output Indicator	Output Definition
C1	Number of enterprises receiving support
C2	Number of enterprises receiving grants
C4	Number of enterprises receiving non-financial support
C26	Number of enterprises cooperating with research entities

Output Indicator	Output Definition
C29	Number of enterprises supported to introduce new to firm products
C34	Estimated GHG reductions

1 Introduction

The DE-Carbonise (D2EE) project was initiated in 2016 with the aim of stimulating demand for low carbon economy goods and services, while delivering improvements in energy efficiency. After an initial three years a project change request extended the project for a further three years to the end of October 2022 (often referred to as “Phase 2”) and while reflecting on the findings of the Interim Summative Assessment [1], sought to increase the number of SMEs making annual carbon savings.

An Interim Summative Assessment [1] was carried out in 2019 at the end of the first three year phase. This report documents the final summative assessment. The assessment was carried out in the final year of the project, with project outputs, financial performance, client feedback including case studies from twenty SMEs and an online survey of the project stakeholders providing the main source of assessment material. The assessment was based on outputs to the end of the first quarter of 2022. The rest of this report considers the assessment of project context, progress, management, outcomes and value for money in turn, concluding with a view of overall success and lessons learned for each stakeholder.

Overall, in summary, the project is considered to have been a success, meeting the project objectives for the SME beneficiaries, raising the profile of the delivery partners in promoting and delivering carbon reduction, exemplified by a number of external awards (3 wins, 3 finalists/shortlisted, 1 highly commended). Although the impact is demonstrated for each individual SME, achieving outputs such as annual carbon reduction for each SME from a tailored set of actions (see Section 5) a study by an academic member of the delivery team in partnership with the Chamber of Commerce provided a more aggregated, broader view of impact. This study identified an increase in the “proportion of businesses deriving turnover from low-carbon and pro-environmental goods and services” from “16% in 2015 to 31% in 2020” [2].

The project is considered to have provided good value for money (see Section 6). Despite this the targets could have been more ambitious and explicit targets for energy reduction and cost saving per beneficiary could have been established at the start to complement the ERDF outputs of greenhouse gas reduction, engagement in research and development and new products. However the project sought to exceed the ERDF output targets and did so, especially greenhouse gas reduction.

The project is coming to an end at a time when demand for its services, especially in an environment of increasing energy costs, is increasing. It is unfortunate that with the project coming to an end at a time when regional funding is still going through a transition following Brexit, there is risk that members of the delivery team will move on, potentially dissipating knowledge and expertise.

2 Project Context

2.1 Background

The purpose of the D2EE project is to stimulate and support (from awareness raising, financial support through to specialist development and technical support) a shift to a low carbon economy, both promoting sustainable economic growth through building the market in low carbon environmental goods and services and associated low carbon innovation to address the issue of climate change amongst SMEs in D2N2. The project context underpinning the first three years of the project is described in the Interim Summative Assessment report [1]. The project primarily initiated to address the D2N2 ESIF Strategy 2014-20 to support a shift towards a low carbon economy in all sectors while building on a smaller project called BESPOKE, which sought to make energy efficiency improvements for SMEs to support their competitiveness. The beneficiaries of the D2EE project are SMEs with the potential to make carbon savings. This covers SMEs at various points on the low carbon journey including those:

- Who wish to reduce the costs of their energy bills
- Who have not previously considered carbon reduction measures
- Who wish to explore how existing products and processes may be re-engineered to reduce carbon
- Who need to gain environmental accreditation in order to grow their business by accessing new customers and supply chains
- Who are associated with or in Low Carbon Environmental Goods and Services supply chains
- Who are associated with energy intensive activities
- Who have a clear, identifiable potential for decarbonisation or development of Low Carbon products and who have exhausted other avenues of funding and innovation collaboration.

The project anticipated potential areas of focus to include manufacturing, engineering and construction with demand anticipated from B2B services such as commercial landlords.

2.2 Project Aims and Objectives

The Logic Model context encapsulates the drivers and objectives set out in the original D2N2 ESIF strategy 2014-20, as discussed in the Interim Summative Assessment Report [1] sections 2.6 and 2.10, to meet priority axis 4b: Promoting energy efficiency and renewable energy use in enterprises and priority 4f: Promoting research and innovation in, and adoption of, low carbon technologies through the reduction of Green House Gas (GHG) emissions, increased share of renewable energy and increased energy efficiency through supporting low carbon business growth.

The medium term objectives within the timeframe of the project were to:

1. Increase economic resilience by delivering improvements in energy efficiency and lowering the cost base of SMEs (*measure: Energy Savings and Cost Reductions from Energy Audits, energy monitoring and Grants C2*)

2. Stimulate demand for low-carbon economy goods and services by increasing the deployment of renewable energy technology and promoting research and innovation in and adoption of low-carbon production (*measure: research and innovation active SMEs identified through C26, new products to firm (C29). Increased deployment of renewable energy technology through Grants C2*)

3. Assist the region in meeting GHG and renewable energy targets by reducing SME GHG emissions. (*measure: Annual GHG reduction from grants and research and innovation recorded as C34*)

2.3 Economic and Policy Context

The economic and policy context has evolved over the past six years. The D2N2 LEP refreshed and extended its original Strategic Economic Plan (SEP) 2019 – 2023 highlighting that low carbon goods and services remain a priority; with the aim to develop a strong local market with support for expanding low carbon skills and jobs [1]section 2.9. Furthermore, COP-26 in late 2021 and the increase in worldwide energy prices in 2022 has stoked interest and demand for skills, leading to over eighty five interested SMEs on the “waiting list” for support. The SEP and current context provided a strong foundation for the project.

The delivery team assert that the strategy has remained constant throughout the six years of the project and responds to specific market failures, namely a lack of up-take of renewable energy due to poor environmental services capacity, awareness and understanding of costs, benefits and resource efficiencies [1]section 2.7. The Logic Model states that the majority of businesses within the region are SMEs, thus focusing on these enterprises strengthened the rationale and alignment with SEP’s ambition to develop a strong local market with low carbon skills and jobs.

SMEs have been supported from a broad range of sectors such as construction, professional, scientific and technical activities and arts entertainment and recreation. SMEs receiving audits and grants are dominated by the manufacturing sector (31%) (See Figure 1). It is important to note that there is growing interest in circular supply chains which potentially cross these traditional sectors. In the latter stages of Phase 2 there has also been a move to sign-post to support which brings together built and natural environment, sequestration and life-cycle sustainability. This is seen as a natural evolution as the SME community maturity in developing and managing low carbon plans increases. However, the project delivery team feel that while a lot has been achieved, there is still a lot more that can be done. Recently, there has been growth in SMEs making direct approaches and looking for support without significant marketing in recent months. The completion of the project in October 2022 is perceived to be an unnatural end and it is not yet clear how the “waiting list” will be supported going forward. The delivery team feel that a mix of place based and sector supply chain based support is needed going forward.

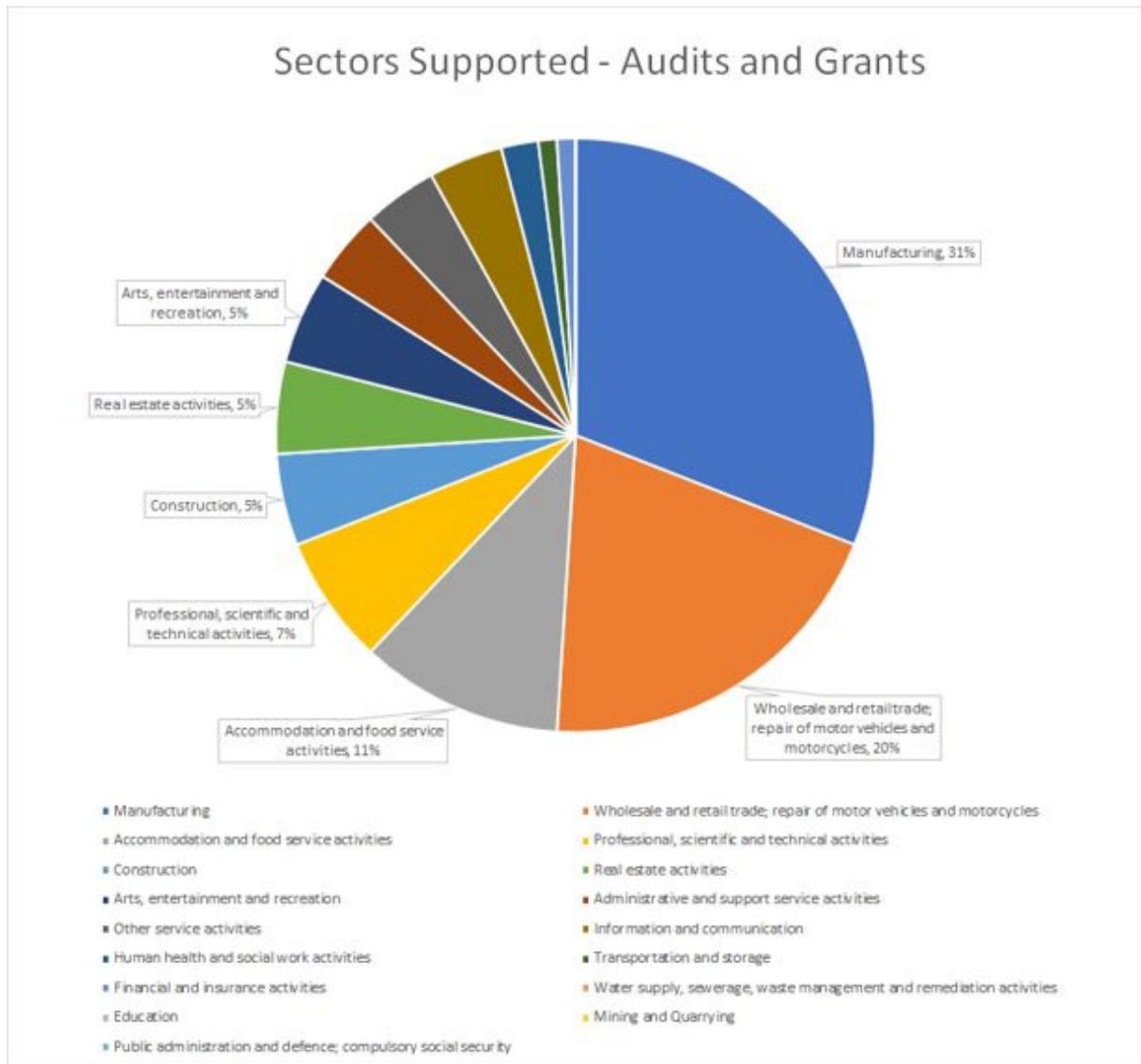


Figure 1: Sectors Supported with Audits and Grants (Derby City Council and Derbyshire County Council) – Provided by Delivery Team March 2022

2.4 Delivery Model Context

The delivery model has been appropriately designed to effectively achieve the objectives of the project. The end of the first three years and PCR for a further three years as “Phase 2” provided an opportunity to reflect on the lessons learned from the first phase [1] section 6.3 and implement some changes in the second phase. These reflections led to changes which relate specifically to the medium-term objectives and are outlined below:

1. Increase economic resilience by *delivering improvements in energy efficiency and lowering the cost base of SMEs*

Of most significance was closer integration of the offer to take the SME on a journey from assessment through a bespoke action plan comprising grants, consultancy and research and development.

2. Stimulate demand for low-carbon economy goods and services by *increasing the deployment of renewable energy technology and low-carbon production*

The grants part of the project facilitated procurement of technology and consultancy advice given recommended options and generic implementation solutions for technology use to reduce energy and reduce carbon. Case studies [3] provide examples of deployed technology and the energy and GHG benefits that have been realised.3. Assist the region in meeting GHG and renewable energy targets.

In Phase 2 the research and development support was further strengthened with tools and software, such as monitoring kits and engineering modelling software to provide quantitative impacts of interventions. GHG emissions impact was extended to the research and development offer as a means of calculating C34 output. Fortnightly triage meetings between the delivery partners provided opportunity to discuss progress with individual SMEs and identify further support to meet their needs.

Additionally, the Low Carbon Business Network (LCBN), which provides networking and events for companies with an interest in the low carbon business sector, was removed from the project at the end of Phase 1 allowing greater flexibility in the range of advice and events, as well as the size of companies that could join the network. However, the LCBN remained closely associated with the project and SMEs engaging with the DE-Carbonise (D2EE) project were made aware of the network and could separately apply to join for additional support.

The following status was reported to the Advisory Board on Monday 16th May 2022, with projected actual aligned with Table 2.

	Output Type	Target	Projected Actual at Project Closure
Phase 1 + Phase 2	C1 - SMEs achieving an output through the project	436	473
	C2 - Grant	166	166
	C4 – Consultancy	153	153
	C34 – Tonnes of saved GHG per annum CO2e	2,401	32,465
	C26 – Collaboration with a Research Base	41	47
	C29 – New Product to Firm	3	3

Table 1: Outputs Claimed so far reported to Advisory Board 16th May 2022

The targets set for the project were realistic and achievable despite the Covid-19 pandemic.

All targets are expected to be met or exceeded by the end of the project. There are currently 32 projects in progress. No project targets were established for energy savings or cost savings as only ERDF outputs were explicitly identified as contractual targets. However, energy and cost savings were recorded for awarded grants evidenced in the Case Studies [3] providing an indication of typical energy and cost savings from certain types of technical intervention. The research and development part of the project also installed monitoring equipment at the premises of cohorts of SMEs so that impact over a long timeframe could be recorded and SMEs could receive direct feedback of the impact of certain decisions relating to their operations. The data is still being collated but in late April 2022 the savings recorded from grants were:

- Energy Savings of 3,451,140 kWh per year (excluding transport grants)
- Cost Savings of £457,226 per year

(Source: Gemma Sylva, Derby City Council)

The pandemic caused some challenges in the middle of the project as the country locked down and this impacted on SME priorities in the short term as well as the University’s ability to access all workshop facilities. There was increased use of online collaboration tools during this period and the delivery of some of the research and development became more drawn out. The flexibility within the match academic resource has been strengthened to support catchup of research and more parallel delivery to provide support to as many SMEs as possible. The productivity and energy

savings elements of the project, especially in relation to supply chains and materials sources were perceived by the delivery team to be a key driver. This is consistent with one of the project objectives of the Logic Model [3]:

“to increase economic resilience through lowering the cost base of SMEs..” [3]

Some SMEs were looking for a more sustained support than can be offered on the project but the balance seems appropriate with those benefiting from research typically supported over a planned 3 to 6 month period. The GHG target could have been more stretching in hindsight given the design of the project, however the delivery team have not felt constrained by this target and have sought to deliver as much benefit as possible.

3 Project Progress

The project is projected to significantly overachieve its output targets (see Table 1 and Table 2), with more SMEs receiving support, compared to the original target and a greater greenhouse gas reduction impact than originally envisaged. One SME dominates the GHG output but even with this outlier the original target is exceeded. Considering progress against the objectives in turn:

1. Increase economic resilience by delivering improvements in energy efficiency and lowering the cost base of SMEs

This has been achieved. The measurement of energy efficiency and cost was driven by the grant award element of the project. The case studies published within the DE-Carbonise Celebration document [3] show that the grants were often provided together with academic support from the University team. For example, see Bridge Thermoplastics Case Study which included advice relating to implementing the procured system. Where recorded, energy efficiency and cost base reduction measures are included with the SME Case Study. The project reflects that it would have been useful to record energy and cost base data for all activity, not just the grants, taking data at the start, during and after the agreed measures were implemented. This is expected to have led to more measurable impact (see Lessons Learned). The recorded savings at the time of reporting are identified in section 2 above. The University also adapted its offer during the project, for example it increased the number of academics with varied specialisms contributing to the project in the last 12 months to ensure flexibility in matching specialism to SME need and allowing a higher number of concurrent projects to be maintained. The Project Officer recorded typically thirteen project activities completing per quarter in the last year of the project compared to between six and eleven in the second year of the project. The first year of each phase included an element of building activity per quarter and the first year of Phase 2 was impacted by the pandemic. This is illustrated in Figure 2.

Potential Customer by Actual Close Date

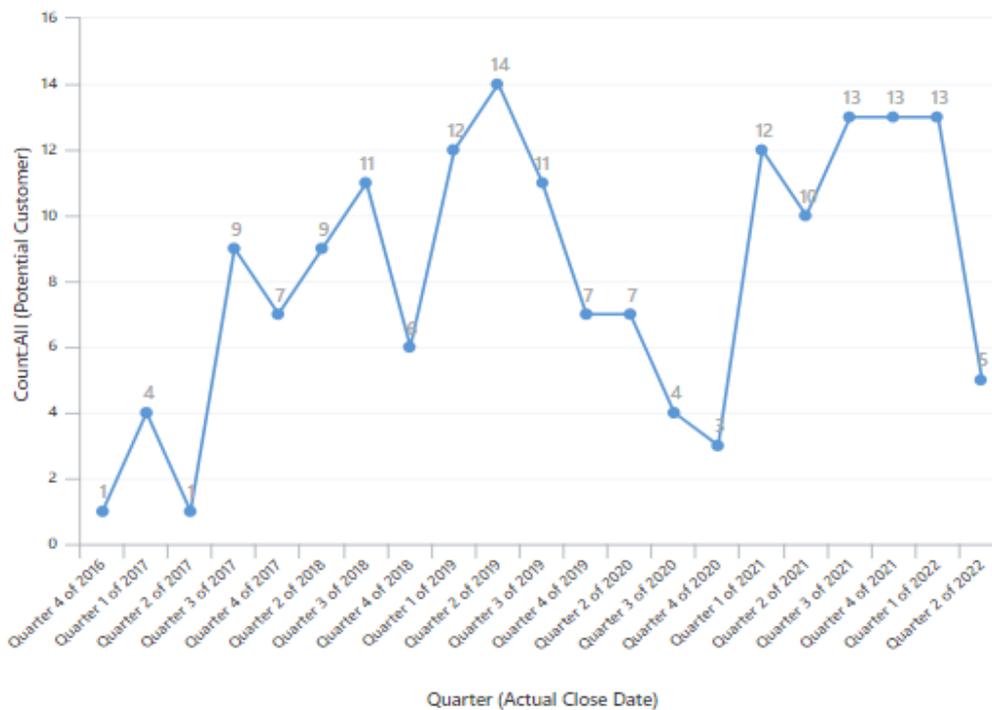


Figure 2: University of Derby SME activity completion by Quarter (note Q2 2022 not complete)

2. Stimulate demand for low-carbon economy goods and services by increasing the deployment of renewable energy technology and promoting research and innovation in and adoption of low-carbon production.

This has been achieved. Research and innovation related to low carbon is exemplified by the C26 outputs which measures the number of SMEs collaborating with the University of Derby on a low carbon research activity. Table 2 shows that this target is almost met and within progress projects (around 32) the number of SMEs engaged in research and development is anticipated to exceed the target (July 2022 – 21 in delivery and 2 needed to achieve target). The Case Studies [3] illustrate a range of research and innovation activity ranging from evaluating the mechanical performance of a sustainable material (Evolution Composites Ltd) for specific applications to exploring waste disposal options (International Logistics Ltd) to developing reusable PPE to reduce plastic to landfill (Riverside Medical Packaging Ltd). The University is continuing to monitor the number of SMEs who maintain research and development collaboration beyond the end of the DE-Carbonise project and which seek Innovate UK smart grants, KTPs and other support.

For grants given to procure low carbon solutions, these were predominantly related to renewable energy technology, low energy lighting and lower energy cooling and heating solutions.

3. Assist the region in meeting GHG and renewable energy targets

This has been achieved. The high GHG reduction (1352%), see Table 1 C34 actuals, is dominated by one SME that achieved a high GHG reduction but even by removing this SME from the figures the GHG target was still exceeded. The delivery team members responding to the questionnaire [5] believe this is due in part to the more integrated offer for SMEs from across the delivery team in Phase 2 such that an assessment can result in a plan of measures combining grants and research and development as well as sign-posting to broader business network support activities. Additionally, the project has gained experience over the course of the years on what can be reasonably achieved with different technologies and options. The delivery team is capturing this in a guidance document for SMEs as an output of the project.

The project completes end of October 2022. Based on the performance to date and the number of active SME projects still in progress, it is projected to exceed the contracted output targets (see Table 2) which are a direct measure of the objectives of the project.

Maintaining spend on the project during late 2020 and during 2021 proved more of a challenge. The main reasons for this were:

- **Staff changes** – There was a change in Senior Researcher early in Phase 2 requiring re-recruitment to the role and temporary role gap. There were other resignations later in Phase 2, the most significant of which was the project officer and project manager who took up career progression opportunities in similar projects at regional Universities. While the project officer role was re-filled quickly and successfully, there were challenges in recruitment of a replacement project manager. Senior manager match was strengthened and the sales and marketing aspects of the role were later filled after a gap in 2021.
- **Covid -19** – The non-pay spend was slow at the start of Phase 2 and then became caught in the working activity restrictions of the Covid-19 lockdowns. As demand for SME activity grew in 2021, the spend was recovered but it was challenging to completely catch up as travel was restricted for a long period and online tools for collaborative working were increased in comparison to office-based activity. In addition, some of the SME projects delivered later in 2022 are awaiting delivery of items which were delayed due to worldwide shortages from the pandemic. This included some of the leisure sector projects looking at both energy savings and activities to lock-in carbon. However, although this has delayed defrayal and completion of outputs, the overall impact was minimised. As such the non-pay performance will improve before the end of the project.

The table below summarises performance at the time of evaluation, which was at the end of Q1 2022 with six months left to deliver the final outputs and defray final expenditure, and with projected performance at project closure. The original Phase 1 targets are presented in Figure 2.1, section 2.19 of the Interim Summative Assessment Report [1]. There was a Project change request (PCR) during Phase 1 which had reduced most of the output targets within Phase 1 while increasing the C34 target to 766 tonnes GHG savings per annum. However, Phase 2 extended the project for a further three years and extended all targets to those presented in the second column of Table 2. Table 2 shows that when the project draws to a close it is expected to achieve what it set out to in terms of outputs and spend and, in the case of outputs, it has achieved more than anticipated.

The table indicates that target spend has been achieved in salaries, overheads, number of enterprises being supported (Output C1), long term collaborations (C26) and estimated GHG reductions (C34)

Indicator	Targets		Performance at Time of Evaluation		Projected Performance at Project Closure		Overall Assessment
	Original (Phase 1)	Adjusted (Phase 2)	No	% of Target	No	% of Target	
Revenue (£m)	2,613	4,786	3,989	83%	4,786	100%	
Capital (£m)	2,280	4,182	3,469	83%	4,182	100%	
C1: Number of Enterprises Receiving Support	375	436	453	102%	473	108%	
C2: Number of Enterprises Receiving financial support	200	166	166	100%	166	100%	
C4: Number of Enterprises receiving non-financial support	175	153	153	100%	153	100%	
C26: Number of Enterprises cooperating with research entities	3	41	36	95%	47	112%	
C29: New Products to Firm	3	3	2	67%	3	100%	
C34 Estimated tonnes of GHG saved/annum	570	2401	32,465	1352%	32,465	1352%	

Table 2: Spend and Output Performance

4 Project Delivery and Management

The partner roles, offer and partnership relationship were summarised in the Interim Summative Report section 3 [1]. This is duplicated as follows:

Partner	Role
Institute for Innovation in Sustainable Engineering (IISE)	Offers research and development, technical support and consultancy, new product development and prototyping.
Low Carbon Business Network (LCBN), University of Derby	Offers support to accelerate business growth in the low carbon sector, as well as a searchable network map that allows SMEs to connect with larger organisations and supply chains.
Derby City and Derbyshire County Councils	Offers energy audits and support to development investment or business plans for energy efficiency within an SME's premises. Manages the low carbon energy efficiency grants scheme which provides capital grants to part fund carbon savings measures.

Table 3: Figure 3.1 Partners and Delivery Roles from Interim Summative Assessment Report [1]–

The project is co-ordinated through the Institute for Innovation in Sustainable Engineering within the University of Derby, located within Lonsdale House in Derby city centre. This provides a site for face-to-face meetings with the delivery team and SMEs when not meeting at the SME site. During the Covid-19 pandemic virtual meetings and contact was maintained using MS Teams and this was also used to deliver some virtual events with the use of collaborative MS Teams retained to the end of the project to facilitate sharing of information across the delivery partners.

Phase 1 did not have a dedicated project manager, but it was felt that such a role would assist to support a more integrated project across partners and so from the learning, from Phase 1 (see section 3.31 of the Interim Summative Assessment Report [1]), Phase 2 extended the role of the Business Development Manager to also cover Project Management supported by an experienced Senior Project Officer, with the technical project lead role provided by a Senior Researcher. During the Covid-19 pandemic the Project Manager and Officer left the project and, while recruitment of a Senior Project Officer was back-filled relatively quickly, the Project Manager role was more challenging to fill. This provided an opportunity to restructure the team to enable broader engagement from across the University of Derby. Assigning a senior lecturer with a background in environmental processes and policy to provide technical leadership and secure resource from the broader colleges and assigning academic leads in sectors matched to SME demand areas such as:

energy and transport, materials, design and manufacturing, sustainable supply chains and future factory, built environment and smart cities and waste management, provided a clearer offer and better links to broader research impact. At this time senior management support was also strengthened which connected various D2N2 SME support projects and co-ordinated some events and delivery across projects.

A fortnightly meeting with all delivery partners ensured SME support across the DE-Carbonise offer was adapted and tailored for their need. The relationships between the delivery partners is strong and well established and the integration of the support increased during Phase 2 such that an SME was able to receive:

- Derby City Council and Derbyshire County Council free Energy Audit to identify and explore measures to improve energy efficiency. This enabled opportunity for an energy efficiency grant to support implementation of identified measures or access to a short technical or business consultancy through the University team. The Councils offered grants between £1,000 and £15,000.
- Collaboration with a research base either through product or process development, options evaluation and life-cycle assessment or measurement and monitoring.

Phase 1 included the Low Carbon Business Network which provided networking opportunities. While this was not included in Phase 2, SMEs were signposted to it and Phase 2 still provided specialist workshops such as circular economy and life-cycle analysis.

The governance and management structures in place were as identified in the Interim Summative Assessment report [1] as:

- Advisory Group – to advise on the project strategic focus (meets bi-annually)
- Project Management Group – to oversee the management of the project and its progress. All active ERDF and ESIF projects are reviewed together to ensure learning and support across projects (meets quarterly)
- Project Triage – representatives from across all the project partners meet to discuss SME interest and delivery progress (fortnightly)
- Grants Board – to independently assess the merits of each grant application (Council partners meet quarterly)

Additional meetings were held within each delivery partner such as weekly short progress meetings. Within the University of Derby this was an online meeting centred on update of a progress log spreadsheet during the meeting with columns tracking the progression of an SME engagement from enquiry to scoping meeting and completion of outputs. This live update of the spreadsheet enabled all team members to have a common view of progress.

Quality controls were put in place to ensure a high standard of delivery centred on review of output reports by a designated academic or senior manager considered to have the relevant capability for the review. Each output report indicates an author (“prepared by”), and reviewer (“approved by”)

and the configuration management indicates draft and definitive states. The reports are issued via the Senior Project Officer enabling a level of check that the reviewer is fine for the report to be issued. The process could be more tightly controlled by requiring the author and reviewer to sign each report before issue as a confirmation of compliance with the process. Similarly, the planning stage could have more visible quality control through a senior academic reviewing and signing the scoping document. However, quality is inferred to have met client expectations, as evidenced by the sample of positive case studies collated [3].

The project adapted and introduced changes to improve delivery as the project progressed. One example, identified by the delivery team, was the introduction of “themes” which assisted in communicating the consultancy and research and development offer to SMEs while facilitating engagement with the academic delivery teams as the link between teaching, research plans and case studies became clearer.

All SMES need to enrol onto the project and this requires eligibility checks to be carried out to ensure the enterprise is an SME and is financially viable and operating in the D2N2 LEP region. The University evolved its processes for scrutinising SME aspirations against the focus of the project and this was further strengthened in Phase 2 through the expectation to create a C34 (GHG reduction) output from the overall cooperation with research (C26) activities. As such the University was able to contribute more C34 output in Phase 2 and was not required to contribute this in Phase 1. For grants, the City and County Council assessed the suitability for grants against criteria to include a minimum of 550kg CO2e saving per £1000 grant spend (source Liz Pasteur, Derby City Council).

Partners continued to be content with the management structure and approach. The management structures in place ensured issues were identified early and potential actions could be explored and implemented. The delivery team found that entering the pandemic a little behind on spend and then having to re-recruit to key roles was challenging. However, the strengthening actions described above appear to have had a positive impact with both rate of outputs, collation of quality case studies and positivity of feedback tangible as the project emerged from lockdown. One SME commented on the quality of delivery as follows:

“I am really pleased with the thoroughness of support by university.” (Mark Johnson, Director Evolution Composites)

There is evidence of the Sustainable Development horizontal principle in delivery of the project. As DE-Carbonise relates to Priority Axis 4, it directly considers sustainable development. For example, some SME collaborative activities directly considered application of sustainable materials e.g. Evolution Composites and sustainability influencing the design of PPE was a focus for Riverside Medical Packaging. GHG reduction was a direct monitored output of the project (C34). The project also considered sustainability in developing a final event for July 2022, considering sustainability in choice of supplier, venue and transport and bringing together policy makers and beneficiaries from the project to share experiences to further build impact. The DE-Carbonise project also put together a GHG calculation process document [5] to ensure a transparent methodology for estimating GHG reduction.

5 Project Outcomes and Impact

The project will significantly overachieve on all targets as shown in Table 2, especially for number of SME beneficiaries (C4), those collaborating with a research base on research and development (C26) and reduced greenhouse gas emissions (C34). Originally, in Phase 1 there were not any targets for “new products to firm” (C29), and a C29 target was introduced in variation number 1 (Phase 1).

As stated in section 2, the Logic Model encapsulates the drivers and objectives, to meet priority axis 4b: Promoting energy efficiency and renewable energy use in enterprises and priority 4f: Promoting research and innovation in, and adoption of, low carbon technologies through the reduction of Green House Gass (GHG) emissions, increased share of renewable energy and increased energy efficiency through supporting low carbon business growth.

The direct impact from the DE-Carbonise project activities was captured through the continuous measurement of the specific SME activity during the project. All the outputs recorded are directly attributable to project activities, from audits and advice through to grants and research and development

Building on the Interim Summative Assessment report at the end of Phase 1 [1], further qualitative data was obtained from the case studies in Phase 2 with a further sample of 10 SMEs collaborating with a research base (20% of C26s in Phase 2) and 10 SMEs receiving a grant (6% of C2s project taken from Phase 2) [3]. A summary of examples of support against each ERDF output type is as follows:

C1 – Number of enterprises receiving support

Some SMEs embraced support from all aspects of the project to maximise the overall benefit to them. An example is Bridge Thermoplastics who, following an initial carbon reduction audit, implemented the recommendations through a grant to upgrade to LED lighting as well as undertaking a review of their cooling system to establish an appropriate size for the chiller, pump and heat exchanger and setup to minimise energy use and this resulted in a grant for a replacement heat exchanger. Bridge Thermoplastics were able to save 23,326 kWh per year and a carbon saving of 6.468 tonnes CO₂e per year for a £6,745.60 grant.

C2 – Number of enterprises receiving grants

The grants were very specific to the needs of the SME and the impact relates to the type of business activity. For example, Croots Farm Shop received a £12,028 grant for more efficient fridges saving them 24,584 kWh energy per year and 6.817 tonnes CO₂e per year. For DSF Refractories, a manufacturing company that incurs high energy costs, a replacement compressor and heat recovery system for a grant of £20,000 allowed them to save 175,500 kWh energy per year and 48.649 tonnes CO₂e per year. The range of grant application covered heating eg new boilers (Glossop Gasworks), new compressor (Spinalong Ltd), LED

lighting and heating control (Terratrip), LED Lighting and Solar Energy (TidyCo and Trusty Pets) and LED Lighting (Arkwright Society).

C4 – Number of enterprises receiving non-financial support

The type of non-financial support ranged from long term study to monitor impact of changes using data collection, called “Smart Factory” to bespoke design, development support. For example, some companies developing low carbon products were looking for support in product development. Evolution Composites were exploring the application of sustainable composite materials eg from flax fibres and needed some application design support using CAD and mechanical testing carried out to explore the structural integrity of products using these materials. Riverside Medical Packaging explored the application of life-cycle assessment in product development to minimise lifetime impact of GHG. This then included product development, design for manufacture and testing to de-risk CE marking. For other SMEs, consultancy was provided to support the company change processes to reduce GHG impact. For example, Westville wanted to understand how they could improve their emissions. An assessment identified that their use of vans, cars and materials had potential for GHG reduction. The company was supported towards travel emissions KPI monitoring, a shift towards EV vehicles and installation of EV charging infrastructure. Similarly, Rayden Engineering was supported with an emissions audit which influenced changes to their vehicles and transport choices.

C34 – Estimated Greenhouse Gas Reductions (Carbon Savings)

International Logistics Centre – implemented wood chipping of wood waste on site to save 10 tonnes of carbon per annum and *“prevented the burning of wood waste and therefore eliminated the release of particulate emissions associated with combustion processes.”*

Cawarden – Staged transition to alternative fuels and installing EV charging infrastructure. Impact of over 1,336 tonnes of carbon (76% reduction), reduction in maintenance costs, noise levels and local air improvements. The case study identifies other impacts such as *“Cawarden has become an exemplar to other businesses that use heavy plant. Demonstrating the cost and environmental benefits that can be gained through collaborating...on pro-environmental business process improvement.”* [3]

C26 – Long term collaborations

Typically, SMEs looking for support in developing new lower carbon products sought longer term collaborations. For example Riverside Medical Packaging (development and testing of sustainable PPE), Evolution Composites (application of new sustainable materials to design, development and testing of products). Review of some of the Memorandums of Understanding relating to C26s reveals a range of activity. For example, evaluation of emissions from buildings and researching implementation options (Gigapeak), explore the technical and economic feasibility for implementing solar energy (S.Khan Poultry).

C29 – Enterprises supported to introduce new to firm products

Evolution Composites – engineering support towards a new product using sustainable materials which are more lightweight and *“could revolutionise the packaging market.”* [3]

Microtech Filters – engineering support towards a new product for capturing air pollutants to improve the air quality in urban areas. *“The CFD model was fantastic for us; it was instrumental.”* [3]

Example benefits for SMEs include:

- Better understanding of energy and resource use (Westville)
- Identifying specific measures to improve energy and resource efficiency and use lower carbon alternatives (Croots Farm Shop)
- Identify and implement actions to reduce operating costs (DSF Refractories)
- Assess life-cycle carbon impact and implement solutions to reduce impact (Riverside Medical Packaging)
- Specialist support for process and product development (Evolution Composites, Microtech Filters)
- Support, advice and networking for continuous improvement (Cawarden).

The Interim Summative Assessment report [1] section 5.4 – 5.7 demonstrates a range of benefits from Phase 1. These include the benefits of academic support, grant applications and the GHG reduction. Some companies found the project useful in achieving environmental credentials for marketing, for example the book of Case Studies [3] in phase 2 identifies that TidyCo attributed their success in part in achieving EN14001 accreditation to the support the DE-Carbonise project provided. The Low Carbon Business Network has provided a forum for companies to share their experiences and provide a community of practice. The Case Studies reveal that some companies are keen to share their experiences with others which will create further impact, for example Cawarden [3].

Some of the consultancy work such as the thermal imaging survey, particle counter and temperature and humidity measurements for Windrush Housing is supporting teaching through practical examples for students who will soon enter the workforce.

Analysis of pro-environmental goods activity for companies over the period 2015 to 2021 by the East Midlands Chamber and University of Derby [2] reported that the proportion of businesses in the region deriving turnover from low carbon environmental goods and services had grown from 16% in 2015 to 37% in 2021 (a doubling over six years), although there is still more work to be done with SMEs as, while 62% of companies with more than 250 employees are integrating clean growth into business plans, it is only 27% so far for companies with fewer than 10 employees. Additionally the analysis suggested that the main increases in turnover from low carbon and environmental goods was *“driven by market entrants and companies gradually shifting their product lines towards low carbon options, rather than ‘specialist’ LCEGS suppliers whose main business model is based on pro-environmental goods and services.”* [2]

This study was carried out alongside the D2EE/DE-Carbonise project and, while it is difficult to isolate the impact of the project from the business environment, nevertheless as it was the only significant support project operating in the D2 region in the earlier years targeting carbon reduction and is closely linked to the Low Carbon Business Network, it is highly likely that the project largely contributed to this impact.

The main quantifiable benefits from the project are recorded for the grants part of the project. This is through linking the grant value to the system procured and installed and directly estimating or measuring impact arising directly from the installation in terms of GHG/annum, energy savings/annum and cost savings/ annum. The benefits from the case studies [3] are as follows:

SME	Grant	Annual GHG Saving kg CO2e	Annual Energy Saving (kWh)	Annual Cost Saving	Annual GHG Saving per £ Grant Kg CO2e/£	Annual Energy Saving / £ Grant (kWh/£)
Arkwright Society	£12,295.14	20,510	80,592	£9,212.00	1.67	6.55
Bridge Thermoplastics	£6,745.60	6,468	23,326	£2,959.00	0.96	3.46
Croots Farm Shop	£12,028.00	6,817	24,584	£3,747	0.57	2.04
DSF Refractories	£20,000	48,649	175,500	£18,398	2.43	8.78
Glossop Gasworks	£5,535.71	3,384	16,934	£886	0.611	3.06
Spinalong Ltd	£2,158.00	1,520	5,483	£877	0.704	2.54
Terratrip Ltd	£4,338.49	2,496	10,799	£1,476	0.58	2.49
TidyCo	£24,504.84 (2grants)	16,050	72,582	£9,802	0.65	2.96
Trusty Pets	£19,790	12,653	49,716	£9,615	0.64	2.51
Average					0.98	3.82

Table 4: Example Energy and Cost Savings from Procurement of Low Carbon Solutions from Grants

As the project has progressed, a larger number of academics have engaged with it and increased their interaction with SMEs, especially the Early Career Researchers. The research collaborations have contributed to the Research Excellence Framework as the academics are authoring conference papers (for example Dr Polina Baranova and Rosemary Horry were submitting to the IEMA 2022 conference at the time of reporting) and in some cases SMEs have developed longer term research collaborations through exploring further research and development and student projects. For example, students became involved in the building assessments for Windrush Housing and Microtech Filters explored developments to their project such as automatic switching.

As reported in the Interim Summative Assessment Report [1], Derby City and Derbyshire County Councils won the title of Energy Efficient Council of the Year in the East Midlands Efficiency Awards in both 2018 and 2019, for their role in the delivery of the project. The project was also shortlisted for the Institute for Environmental Management & Assessment (IEMA) Sustainability Impact Award 2019 and a finalist for the APSE Best Renewable or Energy Efficiency Initiative 2019 and APSE Best Climate Action Initiative 2020. Additionally the project was winner of the East Midlands Chamber Environmental Impact Award 2021 and Highly Commended in the East Midlands Energy Efficiency Awards 2022. This helped raise both the Councils' and University's regional and national profile in delivering energy efficiency schemes.

Since the project started, the D2N2 launched Energy Strategy 2019-2030 – D2N2 Clean Industrial Revolution outlining how the LEP can grow its economy whilst making it greener and cleaner. This specifically referred to the project in helping more businesses and increasing awareness of how to implement more energy efficiency measures and encourage more businesses to reach out in support, thereby removing barriers to effective energy reduction impact in the SME community. (See section 5.11 to section 5.15 Interim Summative Assessment [1])

Academics associated with the project have provided support to the Rail Forum Midlands Sector Deal Innovation Challenges for Decarbonising freight and freight terminals which has supported SMEs access Innovate UK Small Business Research Initiative First of a Kind funding 2021 and 2022 and contributed to carbon reduction solutions entering the regional and national rail sector. These challenges have engaged SMEs and larger companies in the rail supply chain.

6 Project Value for Money

Over the six years the project has matured and evolved and tackled various challenges and changes, such as staff turnover and a two year pandemic, whilst maintaining a focus on the outputs and impact. Overall, the project is judged to have delivered good value for money for the following reasons:

- The project is set to exceed the output target and anticipated impact, for less than the planned overall cost. There were only 3 research and development projects planned in Phase 1 but this was increased to 46 which is judged to be achievable and so more SMEs were able to benefit from research and development support.
- Annual Energy Saving / £ Grant spend from the sample in Table 4 showed 3.82 (kWh/£)
- Added value has been achieved through working with cohorts of SMES and with SMEs sharing their learning and experiences. Some SMEs are now moving forward with monitoring and continuous improvements, further building value.

The value for money is considered to be effective when taken together with the impacts illustrated in the previous section and the range benefits per SME illustrated in the Case Studies [3]. As stated previously, the measured benefits per SME are directly attributable to the project.

The project is judged to have provided a positive return on public sector investment for the economy. Companies that have reduced their energy use will be more resilient as energy prices increase. The Case Studies [3] provide a source of examples to other SMEs of the types of changes they could implement and the benefits they could expect to see and so the impact of the project should continue after its completion. The “Future Factory” part of the project could have better reported on actual results from ongoing monitoring from sensors and incremental changes to reduce energy and environmental impact. This would have provided more quantitative output on energy use and would have illustrated an even greater impact for the project overall. As such the quantitative benefits in terms of GHG emissions and energy savings are under-reported.

Additionally, as supply chains are focussed on 2030 GHG reduction targets and implementing sustainable procurement policies, more sector focussed activities with groups of SMEs may have enabled more circular economy and supply chain solutions to be explored. Accreditation or a mark of commitment to continuous improvements awarded to SMES for their carbon reduction measures may also enable the regional economy to demonstrate its commitment to GHG reduction to corporate clients. This could be a focus for future projects. However, the holistic offer across all delivery partners with a tailored plan of recommendations for each SME is perceived to have been a successful strategy .

7 Conclusions and Lessons Learnt

Overall, the project has been a success at both significantly reducing annual greenhouse gas (GHG) emissions at over 30,000 tonnes CO₂e compared to a target of 2,401 as well as improving productivity through reduced energy use and increasing demand and interest from the SME community in further driving down CO₂e emissions.

The experience of SMEs engaging with the project and contributing case studies has been positive and many SMEs go on to be ambassadors for energy and carbon reduction and “spread the word” of support available. There are over 85 SMEs on the waiting list for support and limited options for offering similar support unless further funding is obtained for a Phase 3.

The DE-Carbonise (D2EE) project was valued at around £8.9million over six years and in Phase 2 alone, delivered over £457,226 per annum of energy savings for SMEs as well as the GHG reduction. This is seen as a success and provided great value for money especially considering the energy savings will be significantly higher as they were only recorded for one part of the project. Phase 2 incorporated lessons learnt from Phase 1 and the better integration of the offer across the delivery partners, to provide a very tailored and deeper support for an SME enabling greater impact. For example, there was opportunity to assess an SME’s operations, recommend and evaluate options and to support purchase of equipment to implement some recommendations. (See section 5)

There is long term demand for DE-Carbonise offer going forward. A natural evolution is to provide support for supply chain groups, linking productivity and sustainability of the business with zero carbon and circular economy and OEM procurement policies for reducing carbon by 2030.

It seems that the deeper and more tailored offer to SMEs across the offer of grants, assessments and research and development in Phase 2 has the potential to lead to greater impacts and support SMEs through longer term, continuous improvements. The delivery partners have also developed strong working relationships over the course of the project with a shared interest in reducing the carbon footprint of SMEs in the LEP region. Although there are more projects coming on stream for SMEs to access (such as: Green Entrepreneurs) there is still not an independent (without commercial interest) central co-ordination of support going forward and the completion of this project in October 22 will leave a needed gap in this regard.

7.1 Strengths of the DE-Carbonise Project

Specific strengths of the D2EE (DE-Carbonise) project build on those identified in the Interim Summative Assessment report [1] and includes:

Exceeded carbon saving targets: Over 30,000 tonnes of CO₂e against at target of 2,400 tonnes.

Increased profile of Councils and University: Derby City and Derbyshire County Councils profile was raised in the region and nationally through winning various awards such as ‘Energy Efficient Council of the Year’ in the East Midlands Energy Efficiency Awards for two consecutive years (2018 and 2019) for their role in the project as well as finalists and highly commended for other awards. The whole delivery team won the Chamber Environmental Award for the project in 2021.

Collaborative Relationships between Councils, University and SMEs strengthened: The collective interest in addressing energy efficiency and carbon footprint in the region which has

brought the parties together has strengthened and has led to an expanding pipeline of interest from SMEs and a desire to continue with similar projects to further deliver impact.

Good fit to regional and national need to carbon reduction and energy efficiency: Aligns with regional and national policies and provides an independent, non-commercial source of support for SMEs in a climate of rising energy prices, and requirement to comply with carbon reduction targets embodied in OEM procurement policies.

Development of expertise in the region: Delivery of the project has enhanced the knowledge and experience of the academic teams, who have developed experience through delivery of consultancy and collaborative research and development, academic papers and building relations with the SME community which will enhance their teaching and contribute to the needed skills of graduates entering the workplace.

Met Market need: The feedback from SMEs and through the evidenced demand for the project identifies the project meets a market need. The challenge is how this need will be met beyond October 22. There are some pockets of support through more recent projects such as Green Entrepreneurs (Derbyshire) but DE-Carbonise's project of support has provided the breadth and the flexibility to tailor support to specific SMEs in need, to maximise the overall impact. This is especially the case in Phase 2 which integrated the support across the partners.

Supported local priorities: The studies undertaken during the project and published such as the Chamber of Commerce study in 2021 [6] illustrates a shift towards a low carbon economy.

Increased SME engagement in innovation: Access to specialist equipment and expertise through the University has enabled the SMEs to progress innovations and removed specific barriers to progress.

Events and networking: The events programme has brought SMEs together which has allowed sharing of experience and expertise. The case studies reveal that SMEs are now supporting others in demonstrating what they have achieved to others which should lead to greater impact for the region. The link to the Low Carbon Business Network provided further opportunity for ongoing support and networking.

7.2 Weaknesses of the DE-Carbonise Project

Sustained availability of specialist academics for consultancy and research - Matching availability of specialist academic staff with the needs of a particular SME was challenging at times, especially at certain points during the teaching calendar. A core of dedicated researchers allocated to the project was key and that these researchers had the flexibility to tackle a range of consultancy and research activities. Resignations and back-fill of dedicated researchers proved a challenge particularly at the change from Phase 1 to Phase 2 and part-way through Phase 2. Organising the project into themes and improving the marketing and offer messaging around those themes in Phase 2 further improved the match of SMEs need with capability. It would also have been preferable to have had the flexibility to swap some staff in and out of the project more quickly to respond to demand.

Project support changes due to resignations – The project officers and business engagement changed part way through Phase 1 and then again partway through Phase 2. Whilst this caused some short term challenges it also provided the opportunity to review the organisation of the

project and implement some changes such as the themes and strengthening the match from the wider college.

Access to workshops during COVID-19 – The pandemic impacted both the SMEs and delivery, especially where work had been initiated which required access to workshops. However, the Institute for Innovation in Sustainable Engineering was operational for most of the pandemic and so it was the scientific workshop, materials testing, which was most impacted. The project then strongly recovered after the pandemic.

Meeting demand for grants – Many SMEs were looking for tangible financial support to buy equipment such as lights, solar panels or fridges. All the grants allocated to Derbyshire were awarded well before the end of the project. Although the grants for the Derby City were more challenging to assign, it would have been good to be able to serve more of the Derbyshire companies who were eligible for support.

7.3 Lessons Learned

7.3.1 The Project Delivery Body

Effective collaborative partnership between local government, local knowledge base and SME to address a topic of mutual interest is considered by all parties to work well for driving a change such as energy efficiencies and carbon reduction.

Ensuring a large pool of match specialist staff is available to provide the flexibility needed to meet the needs of individual SMEs through provision of the right mix of expert skills. This both ensures ability to support a broad number of SMEs, mitigate risks during periods of staff turnover and ensures momentum of delivery can be maintained where a specific project needs attention. The identification of expertise themes also provided a clearer link for project support staff to match SMEs to the appropriate experts and provided a better link into academic research and knowledge exchange agendas which further mitigates core academic staff turnover for those on a researcher career path.

Fixing an intervention level for grants – This was a challenge in the early part of the project as the intervention rate was not fixed and this private sector investment contributed to the match for the Council part of delivery.

Considering SMEs in place or sector based groups – when defining events and communicating the offer. There are common generic challenges for SMEs in sectors and shared issues in a local area and bringing this dimension to the project may further assist in tailoring support.

Use of collaborative software tools – greatly assists with communication and sharing of information and can assist with holistic marketing strategies and approaches.

Managing expectations in delivery – particular care is needed in scoping documents to ensure that bounding assumptions and terms such as “prototype” are clearly understood and are consistent with the effort estimated. For technical projects, senior academic oversight from the technical specialist area is needed throughout the project and the senior academic should be visible to the SME at key points through the lifecycle.

Collating and publishing case studies as projects complete – this enables the SME to contribute to the case study while the experience is current. Publishing the case studies on the website in a timely manner then allows impact to be demonstrated early and provides examples to inspire other SMEs.

7.3.2 Those Designing and Implementing Similar Interventions

Fixing an intervention level for grants – This was a challenge in the early part of the project as the intervention rate was not fixed and this private sector investment contributed to the match for the Council part of delivery.

Build in flexibility to tailor offer to individual need – Ensure that the overall energy reduction, low carbon and growth in low carbon goods can be met by allowing flexibility and tailoring of an offer from a mix of grant, consultancy and research and development.

Ensuring long period of support for each SME – Many SMEs look for support over a long period of time so that the implementation of change can be assessed and they can be supported to take the next steps. The continuity of support should be in years rather than just three to six months.

Considering SMEs in place or sector based groups – when defining events and communicating the offer. There are common generic challenges for SMEs in sectors and shared issues in a local area and bringing this dimension to the project may further assist in tailoring support.

Ensure baseline carbon emission data is collected from each company during the initial diagnostic or consider promoting monitoring and data collection from the outset.

7.3.3 Policy Maker

Consider the target sectors and supply chains and/or “place” based focus from the outset as this impacts on marketing strategies and messaging in early planning and can potentially enable enhanced benefits and value from targeting groups together.

8 References

- [1] Carney Green, “D2EE Low Carbon Project,” Carney Green, October 2019.
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- [3] DE-Carbonise Project Team, “DE-Carbonise Celebration, University of Derby, Derby City Council & Derbyshire County Council,” University of Derby, Derby, 2022.
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9 Version History

Version	Status/comment	Issue Date	Version Author	Reviewer/ Approver
0.1	Draft	07/04/2022	Paula Shaw	
0.2	Draft - Clean copy for review	21/06/2022	Jenny Clementson	Amanda Baxendale
1.0	Approved	19/07/2022		Ian Bates

Note: A report is at “Draft” status until it has been reviewed and approved for issue. An Approved document is identified as “Definitive”.