



Brampton and Beyond Energy

Initial Feasibility Study

2 February 2015

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Document Information

Project	Brampton and Beyond Energy
Technical Subject	Initial Feasibility Study
Client	Brampton and Beyond Energy Ltd
Client Representative	Tim Coombe, Chairman
Project No.	RCEF0314
Filename	RCEF Brampton
Project Manager	Hazel Broatch, Reiver Renewables

Document History

Date	Release	Prepared	Approved	Notes
25.11.14	1.0	hb	pd	Emailed to client for comment as work in progress
2.12.14	2.0	hb	pd	Emailed to client for discussion at meeting on 3/12
8.12.14	3.0	hb	pd	Emailed to client for comments
9.12.14	4.0	hb	rd	Emailed to client for comments
9.12.14	Final Draft	hb	pd	Emailed to WRAP for evaluation
2.02.15	Final Report	hb	pd	Emailed to WRAP for sign off

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FOREWORD

Rural Cumbria Connects (RCC) was commissioned by Brampton and Beyond Energy Ltd (BABE) to undertake a Rural Community Energy Fund (RCEF) – “Initial Feasibility Study”. RCC is a consortium of a range of private and charitable organisations who are working in community and commercial renewable energy generation. They have experience in a wide range of technologies – Anaerobic Digestion, Hydro, Solar, Onshore Wind, Marine, District Heating Systems and Biomass. The consortium also includes experience in energy reduction and saving. The organisations involved have signed up to a Memorandum of Understanding.

RCC shares a common vision of local and distributed community energy (alongside a drive for energy savings) making a significant contribution to the generation of renewable energy and a reduction in carbon emissions in rural communities whilst contributing to sustainable development and quality of life. RCC wants to use its collective expertise to help rural communities who want to develop community energy systems; build increased capacity in Cumbria to deliver community energy projects; and create economies of scale to ensure value for money and affordability.

On this project the main companies involved in the research for the Initial Feasibility Study were Biogas Power Ltd, Cumbria Action for Sustainability, and Reiver Renewables.

The Report will enable BABE to decide if their ideas are viable or not by providing them with facts and figures and identifying alternative approaches and solutions where appropriate. This will enable them to decide on whether to make an application to Stage 2 of the Rural Community Energy Fund or not.

In compiling the report RCC, as required by WRAP, has used the RCEF Initial Feasibility Report Checklist for the basic structure. This ensures the study addresses the questions it raises as listed. The aim has been to keep the body of the report relevant and focussed. The detailed workings and findings are to be found in the Appendices.

The study has been managed by a Steering Group made up of representatives of BABE and RCC who have met monthly since the project started. RCC would like to acknowledge the invaluable input from BABE and their support in providing local knowledge and direction as necessary as well as acting as guardians for the community interest. Finally, RCC would like to acknowledge the input from the community, the stakeholders; and the local farmers without which this report would not have been possible.



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Executive Summary

1. Background to the Report

- a. Brampton (Grid Ref NY 528610) sits at the heart of the rural area to the North East of Carlisle District in North Cumbria. It is a Market Town and has had a Market Charter since 1252. It has a significant range of community facilities – Primary and Secondary Schools, Post Office, Doctor’s Surgery, Dentists, Cottage Hospital, Library, a range of small independent Shops, weekly Markets and monthly Farmers Markets, Restaurants and Cafés, Pubs, Hotels, Fire Station, Churches, Community Centre, Railway Station and local amenity areas.
- b. Brampton is described as the Market Town which provides the focal point for the surrounding rural communities and villages. The area is known as “Brampton and Beyond”. It is 9 miles east of Carlisle and 2 miles south of Hadrian’s Wall.
- c. BABE was set up as an Industrial and Provident Society trading for the benefit of the community. The Directors have a range of expertise in engineering; renewable energy; local government; micro-biology; business management; health and safety and community energy engagement. They are active within a range of local organisations – Sustainable Brampton; Brampton and Beyond Community Trust; The Farmers Market; etc.
- d. BABE’s vision is to generate renewable energy at scale for the benefit of the community. They have commissioned two previous feasibility studies looking at the potential for Anaerobic Digestion (AD) at Townfoot Industrial Estate in Brampton. One was a Desktop Study and the other was a Feedstock Study.
- e. An Open Meeting was held in February 2014 to report on the findings of the Feedstock Study. Over 200 people attended that meeting many of whom came because they objected to the proposed location of the AD plant which had been presented at the public meeting as the recommended option for a community led energy project, subject to their approval. They also did not fully understand why BABE had discarded other renewable energy technologies.
- f. BABE’s success in securing RCEF Stage 1 funding has enabled them to respond to that feedback and review what renewable energy resources are available in the area; what the constraints are; what the community thinks; and identify what is feasible for community energy generation at scale.
- g. The Initial Feasibility Study gives an assessment of viability, facts and figures to aid decision-making; and where appropriate alternative approaches to putting BABE’s vision into practice.



2. Short Summary of Findings

a. Potential Renewable Energy Installations

- i. Following detailed analysis using the DECC Renewable Energy and Low Carbon Energy Capacity Methodology (Methodology for the English Regions 2010) the potentially deliverable options were identified as being:
 1. 50kW Archimedean Screw at Greenholme;
 2. 100kW Solar PV at Townfoot Industrial Estate;
 3. 2mW Anaerobic Digestion Plant at Irthington;
 4. Sustainable Biomass Supply Chain; and
 5. Gas CHP powered heat network in Brampton.
- ii. Brampton and Beyond Energy Ltd have a vision to be a net exporter of electricity in the next 20 years and therefore want to develop community renewable energy at scale.
- iii. It was therefore agreed at this stage to look at Solar PV and Anaerobic Digestion in more detail.

b. Solar PV

- i. Brampton has an Industrial Estate at Townfoot Park. This park has a total letting of 53,464ft². It is set out in 6 blocks with 5 of the blocks being within 15 degrees of due South. It has an owner/occupier who has South facing unshaded 0.5acre site that he is “in principle” willing to let to BABE for a community energy installation.
- ii. There is the potential for a 100kW installation ground mounted on the site identified for rent.
- iii. This is an ideal location for Solar PV as there is considerable day-time usage; little shading; land to rent on a brownfield site; grid connection capacity and excellent hard-core access.
- iv. A survey on the Industrial Estate identified 100% interest in purchasing electricity from a community energy installation especially if it helped reduce costs and provided long-term security of supply. This will also help secure jobs on the Industrial Estate which has been identified by the Parish Council as a critical factor for Brampton.
- v. The installation would also be financially viable and produce a community benefit of an estimated £16-17,000 per annum.
- vi. BABE plans to pursue this low-risk development as a priority. Community generation and community investment in Solar PV is a well-trodden path so BABE will easily access peer support.



c. Anaerobic Digestion

- i. Brampton has been a market town at the heart of a rural community since 1252. BABE has recognised for some time the potential for the local farms to supply a community energy scheme. They commissioned a Feedstock Study which reported in February 2014.
- ii. The study was based on siting the Anaerobic Digester at the Industrial Estate in Brampton.
- iii. This study took a different approach and started with the possible range of feedstocks in the wider Brampton area and using central place theory concluded that an Anaerobic Digester would be better located near Irthington.
- iv. A site on a working dairy farm was identified and the landowner has agreed “in principle” to rent the site for a community energy installation. The site is surrounded on three sides by agricultural land and is opposite Carlisle Airport.
- v. Building on the Feedstock Study this study concluded that the community can be confident about feedstock supply for a 500kW capacity Anaerobic Digester.
- vi. An Anaerobic Digester will contribute to the long-term future of local farms who are key employers and who face some challenging times in responding to significant changes in subsidy levels alongside significant downward market pressures.
- vii. BABE is confident it could generate a community benefit of £60,000 per annum. However they recognise that it is high risk development and will try to mitigate that risk by securing Rural Community Energy Fund Stage 2 support.

d. Community Support

- i. Following three drop-in sessions, a questionnaire to 1,965 households, stakeholder consultation and significant local press and media coverage the study has evidenced the following:
 1. 93% of the community support renewable energy generation;
 2. 93% were familiar with Solar and 37% with AD;
 3. 67% would be happy to have Solar close to their homes; and
 4. 56% would be happy to have Anaerobic Digester Plant in wider Brampton area.



e. **Planning and Permitting**

- i. Research was undertaken into identifying the statutory constraints, traffic implications, environmental implications and identifying the community's views – before preferred technologies and sites were identified.
- ii. Informal pre-planning advice was sought from both Carlisle City Council (Planning Authority for Solar PV) and Cumbria County Council (Planning Authority for AD).
- iii. The Environment Agency has also been consulted about Permitting. They have advised that the AD at the identified site would meet the requirements for a Standard Permit.
- iv. Solar PV would be a permitted development.
- v. Cumbria County Council based on the information currently available identified no key showstoppers but formal pre-application advice will be sought before submission of a RCEF Stage 2 application.
- vi. The study has concluded that the AD is likely to secure a Standard Permit and Planning Consent.



Section 1: Local Community Support and Stakeholder Engagement

1. Level of Support

- 1.1.1. Questionnaires were hand delivered by volunteers to 1,965 of the 2,180 homes in Brampton. A total of 246 responses were received, representing a 13% response rate. Appendix 1 is the detailed report on the consultation exercise.
- 1.1.2. There was overwhelming support for renewable energy generation in principle, with 93% of the respondents saying they support the idea, compared with 6% who don't.
- 1.1.3. "Cheaper energy" and "reduction in carbon emissions" are the benefits that respondents considered most important, with "greater local control of energy supply" and "greater community cooperation" considered least important. "Reducing fuel poverty" fell in the middle. The overwhelming majority of respondents considered all these benefits to be either "very important" or "fairly important". These findings give BABE confidence that their vision is supported by the local community.
- 1.1.4. The technology that most respondents were familiar with was solar (93%) followed by wind (84%), hydro (61%), biomass (44%), anaerobic digestion (37%) and geothermal (36%).
- 1.1.5. 8% already have renewables installed and indicated their willingness to share data on its performance.

1.2. Project Feasibility and Community Support

- 1.2.1. Section 3 of the report details the results of applying the DECC methodology which uses a reductive process to determine what is practically feasible in the Brampton area in terms of solar, anaerobic digestion, hydro, wind, geothermal and biomass. The last stage in the process is "target setting" which covers "community ambition".
- 1.2.2. The results of this process were to identify the two most feasible projects of scale at this stage— Solar PV installation at Townfoot Park Industrial Estate and an Anaerobic Digester in the wider Brampton area sited on a working dairy farm at Irthington.
- 1.2.3. Solar is the technology that most respondents said they would be happy to have close to their home (67%). A further 18% would be happy to have it in the wider Brampton area. AD was the technology that fewest of the respondents were happy to have close to their home (11%) but a further 45% said they would be happy to have it in the wider Brampton area (56% in total).
- 1.2.4. The evidence is that the location of a solar PV installation on an Industrial Estate near to residential homes would be acceptable to the local community. It also makes sense to locate any ground mounted panels on a brownfield site with good financial returns (high levels of daytime energy use) to maximise potential for community benefit.
- 1.2.5. The evidence (Section 3) is that the location of an AD at Irthington makes more sense when you take a step back from the initial consideration to site at Townfoot Industrial Estate and look at where the feedstock supplies are in Brampton and Beyond area of benefit. The evidence is that the 56% of community would support an AD in the wider Brampton area.



1.3. Methodology

1.3.1. Qualitative Research

- 1.3.1.1. The questionnaire was designed to include a number of open, free text questions that allowed people to provide more detailed responses to draw out qualitative data.
- 1.3.1.2. Attendees at three drop-in sessions had one-to-one discussions with both BABE and RCC. These discussions centred on improving their understanding of renewable technologies; answering their concerns; demonstrating what other communities had achieved in community energy generation; and explaining what BABE aimed to achieve and why.
- 1.3.1.3. The attendance at these sessions was not statistically significant despite advertising by posters in Brampton, on BABE website, in the local press and media, and on each of the questionnaires delivered to households in Brampton. In total we had 28 attendees.

1.3.2. Quantitative Research

- 1.3.2.1. The questionnaire was the central plank of the consultation. The questions consist predominantly of closed questions to provide quantitative data.
- 1.3.2.2. The principal means of distributing the questionnaire was through door-to-door canvassing with volunteers knocking on doors and introducing the survey, then asking householders to complete it and leave it sticking out of their letter box so that it could be collected within the next hour or two (with other options available for anyone unable to complete it there and then).
- 1.3.2.3. The volunteers were recruited from various networks and a total of 12 were recruited. They were provided with a 30 minute briefing session. Delivery rounds with specific addresses were allocated to individual volunteers.
- 1.3.2.4. An explanation for how the answers to each question were analysed if given within the text of the consultation report (Appendix 1) under each question heading.
- 1.3.2.5. The 13% return means the findings of the consultation exercise are statistically significant.
- 1.3.2.6. BABE concluded that the 77% of the households which ignored the survey would be unlikely to object to a renewable energy scheme, particularly if one was located some distance from their home. Indeed, informal conversations conducted during the distribution of the questionnaires indicated that the attitudes of a high proportion of this “apathetic majority” could be improved given more time and effort.

1.3.3. Conclusions

- 1.3.3.1. RCC has reported in full on the findings of the consultation to BABE and to the Key Stakeholders. They will report back to the community at a series of engagement events in the New Year once the Initial Feasibility Study has been



approved. These events will include localised events in the Townfoot and Irthington areas.

- 1.3.3.2. The findings are statistically significant and BABE and RCC have used the findings to inform the identification of the proposed installations and to give BABE confidence about the likelihood of obtaining planning permission, income generation through community share issue and the required scale of installation.

2. Landowners and Stakeholders

- 2.1. The key landowners identified, following the technical deployment assessment, were consulted.
- 2.2. For AD this was a farmer based outside Brampton at Irthington who has indicated his willingness to rent a site to BABE. This has formed the basis of consultations with Electricity North West, Cumbria County Council (The Planning Authority); and the Environment Agency.
- 2.3. For Solar PVs at Townfoot Industrial Park in Brampton there are a range of landlords. Our recommendation is that there is a greater chance of success working with a local landowner who is interested in renewable energy and in working with a local community organisation. This has led to a recommended site for ground mounted panels with the rest of the panels being located on owner/occupier rooftops. The owners have all indicated their “in principle” willingness to rent land and/or roof space.
- 2.4. 17% of the householders who responded to the questionnaire also might consider renting their roof space for a community solar energy scheme.
- 2.5. The Parish Council are also interested in being involved in a solar energy development for community benefit.
- 2.6. Two Stakeholder Consultation Events were held on 28 August and 5 November 2014. These events included presentations by BABE and Rural Cumbria Connects and question and answer sessions (Appendix 2). The first event was also used to consult the Stakeholders about the questionnaire before it was finalised. The Stakeholders identified the need to hold sessions so that the public could better understand the technologies. This feedback led to the drop-in sessions and the “Introduction to Renewable Energy Technologies” factsheet (Appendix 1) which was distributed along with the questionnaire.
- 2.7. Following the Open Meeting in February 2014 the Parish Council has been asking for another Open Meeting about “green energy”. It has been agreed that a range of engagement events will be arranged for the New Year once the report has been “signed off” and a final version is approved.
- 2.8. The stakeholders are supportive of community energy generation and BABE has been told by them that it is “knocking at an open door”. BABE is committed to continuing the dialogue that has been opened with key stakeholders and has started consultation with the Parish Council and others about how this is best achieved.
- 2.9. In consultation with BABE a range of key stakeholders were identified:



Who	Engagement Activities
Brampton Parish Council	2 Stakeholder Consultation Events and a meeting with the Chairman
Carlisle City Council	2 Stakeholder Consultation Events
Cumbria County Council	2 Stakeholder Consultation Events
Sustainable Brampton	2 Stakeholder Consultation Events
Brampton and Beyond Community Trust	2 Stakeholder Consultation Events
National Farmers Union North Cumbria	2 Stakeholder Consultation Events
Brampton Churches Together	Presentations given at above events
Brampton Business Association	Presentations given at above events
Local Farmers	Individual meetings and phone calls

3. Invest, Purchase Energy or Otherwise Support the Project

3.1. Invest

3.1.1. 40% of respondents to the questionnaire indicated that they would be willing, in principle, to consider investing in a community renewable energy scheme. Of these, the most popular amount they might consider investing was £201 - £500 (26 respondents), followed by £500 - £1,000 (22 respondents). 8 respondents said they might be willing to invest more than £1,000, while a total of 42 might consider £200 or less.

3.1.2. Around 50% of the respondents said they would not be willing to invest (129 respondents).

3.1.3. Those who expressed an interest are being added by BABE to the existing database (currently over 300 names) which will form the base group for any future community share promotion.

3.2. Purchase Energy

3.2.1. The farmer would purchase both electricity and heat from BABE if it reduced his costs.

3.2.2. Discussions with the airport developers (now they have secured planning consent) will be held over next couple of months but the expectation is that they too could be interested in purchasing electricity and heat at a reduced cost.

3.2.3. A face-to-face survey of the occupants of Townfoot Industrial Estate found that 100% would be interested in purchasing electricity from BABE if it reduced their costs and gave them greater security of supply. All the units on and near the site operate in daylight hours with majority of them open 6 out of 7 days.

3.3. Other Support

3.3.1. When asked what level of personal involvement community respondents would consider, the most common response was that they would attend public meetings/events to find out more (42%), followed closely by a wish to be kept informed with email updates (39%).



3.3.2. 26% of respondents did not want any personal involvement, but would be broadly content for BABE to make decisions on their behalf.

3.3.3. In terms of active involvement, 8% said they would be happy to deliver house-to-house leaflets, 6% would be prepared to help organisation of events and activities, 3% could offer expertise, and 3% could help with other aspects of the publicity campaign.

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Section 2: Local Community Benefits

1. The questionnaire asked people for their opinions about community benefits. When asked which of a list of benefits they would like to see from any income generated by the scheme, “rural community transport support” and “Community Centre improvements and equipment” were the most popular, followed by “health and wellbeing activities”, “capital and revenue expenditure” and “support to welfare cases”. “Professional training courses”, “personal development”, and “support to local arts and crafts projects” were least popular.
2. Respondents suggestions for how community benefits could be selected included a public vote (most popular), or by committee or following public consultation. The idea of having a committee has been discussed by BABE and they would wish to include key stakeholders and local community representatives like the Parish Council on such a body.
3. The rural population around Brampton would benefit from investment in transport. This could benefit around 8000 people (mainly those living in the rural area around Brampton). The footfall at the Community Centre is about 60,000 people per annum, comprising around 3,000 separate users. The scale of impact should therefore be significant.
4. The proposed AD installation could provide an income estimated to be in the region of £289,500 and BABE have concluded that in principle net income up to £60,000 could be disbursed for community benefit (this will all, ultimately, be dependent on the final business model).
5. The proposed Solar PV installation could provide an income estimated to be in the region of £16,000 per annum for community benefit (this will, ultimately, be dependent on the final business model).
6. The Solar PV installation at Townfoot Industrial Park would support local businesses (and therefore employment) by supplying electricity directly and thereby reducing their electricity costs. The Parish Council (amongst other stakeholders) has identified that the sustainability of local businesses is an issue for the community.
7. An AD would create 4 FTE jobs and could offer opportunities for 2 Modern Apprenticeships. It would also support the host farm by reducing costs of electricity and heat thereby safeguarding jobs. The potential to supply electricity and heat at reduced cost to the newly developed airport would also benefit the local economy.
8. BABE is committed to the installations producing not only a financial return but an environmental and social return. This will be determined as part of the next stages of development of the installations. To-date they have identified the following:
 - a. the AD to enable them to develop a range of other social enterprises/community projects
 - i. by providing affordable heat for vegetable growing in polytunnels; and



- ii. by using heat for biomass woodchip drying.
- b. the Industrial Estate Solar PV installation to save over 40000 of CO² per annum.

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Section 3: Site, Operation and Technology

Introduction

The study used the DECC Renewable Energy and Low Carbon Energy Capacity Methodology (Methodology for the English Regions 2010). This methodology is reductive in nature and drills down from Stage 1: Naturally Available Resources to Stage 7: Target Setting to identify the currently realistic and most readily deliverable options for generation at scale. Appendix 3 details the presentations given to BABE RCEF Project Steering Group of the results of applying this methodology to the range of renewable technologies at Milestones 1, 2 and 3 identified in the Project Plan.

Appendix 4 details the findings for each of the technologies assessed,

At the end of Milestone 2 the potentially deliverable options were identified as being:

- 50kW Archimedean Screw at Greenholme;
- 100kW Solar Array at Townfoot Industrial Estate;
- 2mW AD Plant at Irthington;
- Sustainable Biomass Supply Chain;
- Gas CHP powered heat network in Brampton.

BABE discussed these options in the context of their Strategy:

- Phase 1 Promote energy saving (continuous)
- Phase 2 *Develop a large scale renewable energy project*
- Phase 3` Support other local RE schemes
- Phase 4 Formation of an energy distribution company (5 years +)
- Phase 5` Brampton becomes net energy exporter (20 years +)

They also took into account the interim findings of the consultation exercise.

BABE decided that they wanted RCC to look further at Solar PV at Townfoot Industrial Estate and an AD Plant at Irthington. These projects would both be renewable energy projects of scale which in the longer term would also contribute to the aim for Brampton becoming a net energy exporter. AD in particular has a key role to play in providing baseload as it could generate electricity 24/7/365. The estimate is that Brampton needs to have 3mW of renewable generation capacity to meet its domestic electricity demand. Currently it is estimated to have a shortfall of 2mW (Appendix 3: Milestone 2 Presentation).

Further assessment identified that 100kW Solar PV installation (either ground or roof mounted) is realistic but it was agreed that 500kW AD was more realistic for a community organisation. BABE debated the trade-off between the need for developments of scale to deliver on its aims with the desire for as much control as realistically possible. The Board then discussed the flexibility of AD and its potential to be scaled up over time. BABE wants to inject environmental and social criteria into the design of the development and this further underlines the need for as much control as possible. For example, they discussed potential to contribute to food security in the local area by using heat



from AD to fuel polytunnels for vegetable growing. BABE concluded that they wanted to develop a smaller scale 500kW AD, primarily to minimise risk but also to ensure they maintain maximum control of the project. AD capacity could always be increased at a later date, if desired. The landowner has indicated his willingness to rent additional land if required in the future.

Brampton and Beyond Community Trust (a sister organisation) are now exploring the potential for Gas CHP to power a heat network in Brampton as part of their business planning for the future.

In light of the fact the study is looking at two technologies the following, for clarity, looks at Solar PV first and then AD.

1. Potential Site for Solar PV

- 1.1. A suitable location has been identified for the Solar PV installation (Appendix 5). The installations could be sited either on the roofs at the Townfoot Industrial Estate or on a piece of land on the Industrial Estate.
- 1.2. The Industrial Estate is brownfield. The Planning Authority (Carlisle City Council) has confirmed that this would be a permitted development and therefore would not require planning consent. This permitted development is subject to limits and conditions. They particularly drew attention to the limits on roof locations. The roof mounted development would need to comply with Building Regulations.
- 1.3. The implications of the key limits¹ are:
 - 1.3.1. Ground mounted no higher than 4m; 5m from boundary of site; nor more than 9m²
 - 1.3.2. Sloping roof mounted no more than 200mm from roof slope and 1m from edge.
- 1.4. The site would have significant day-time usage which is critical to the economics of any installation.
- 1.5. The site has 18 units arranged in 6 blocks and was originally constructed during the 1980s. There will be no access issues – the Estate has hard-core throughout with car parking and loading and unloading facilities. We have identified two options – one ground mounted and the other roof mounted. A survey of the businesses on the Estate identified a preferred site of 0.5acre with an owner/occupier who has already explored Solar PV installation but does not have the money to invest. We have estimated this has potential to be up to 100kW installation. He has stated that in principle he would be willing to rent the land to BABE. The survey also identified that all the owner/occupiers on the Industrial Estate would be interested in renting roof space as would some householders. The Estate will also give sufficient roof space for a 100kW installation.
- 1.6. The financial returns currently on either option are similar. Ease of construction and security about ownership would suggest that the ground mounted option would be the best option.
- 1.7. The client expressed their wish for a “quick win” so they can demonstrate their commitment to community energy generation and progress their aims. We have therefore recommended that they develop the ground mounted Solar PV installation rather than the roof mounted option at the Industrial Estate.
- 1.8. The expectation is that the management of the installation would be contracted out because a Solar Array would not require day-to-day management or maintenance. The site

¹ www.planningportal.gov.uk/permission/commonprojects/solarnd/



management would be seasonal ground maintenance and annual cleaning/checking of installation. It too would be contracted out.

2. Solar PV: Technology and Operation

- 2.1. Our assessment of the solar resource in Brampton is that it is sufficient to support a 100kW capacity Solar PV installation (Appendix 4).
- 2.2. Appendix 1 evidences the strong community support for a Solar PV installation in Brampton.
- 2.3. There are two 33/11kVa situated on the Industrial Estate which have sufficient capacity for any energy export over and above that purchased directly from occupants. All the blocks have three phase supply. The assessment is that grid connection will not be an issue. An application to the DNO (Electricity North West) is currently being submitted by Brampton and Beyond Energy to get a budget price for the grid connection.
- 2.4. The Industrial Estate is occupied throughout the year and therefore energy requirements (especially the need for daytime usage) are excellent for a Solar Array. The Estate includes a haulage company, range of suppliers to general public and trade, garages and body repairers, wood producers, Recycling Centre, Highways Depot and a range of manufacturers.

3. Potential Site for Anaerobic Digester

- 3.1. A suitable site has been identified at a working dairy farm at Irthington near Brampton (Appendix 6). Discussions have taken place with the farmer and he has said “in principle” that he would be willing to lease the site to BABE. Central Place Theory was used to identify the location once an assessment of the feedstock supplies and the Feedstock Study (Appendix 7) had been completed. This is an entirely different approach than that taken for earlier Feedstock Study which started with a proposed site. The site at Irthington is ideal for delivery of slurry and other farm losses² and for removal of digestate.
- 3.2. The Feedstock Study which reported in February 2014 was comprehensive and included the area around the proposed site at Irthington. This report significantly informed our findings on feedstock supplies. This study extended the area of supply by overlaying a 5km radius from the site at Irthington.
- 3.3. Extending the area identified the potential for feedstock to supply a 2mW AD (Appendix 4).
- 3.4. The Feedstock Study had involved considerable consultation with local farmers. Our findings were that two of the farmers had in the meantime decided to develop their own ADs (both had secured Planning Consent and started construction). However the majority were still interested in supplying an AD. The Supply Agreement in the Feedstock Study will form basis of formalising these relationships at RCEF Stage 2.
- 3.5. The Environment Agency have been consulted and confirmed that the site would be covered by a Standard Permit. There are no restrictions on the site’s use and no constraints.

² WRAP On Farm AD Fund Guidance 2014 <http://www.wrap.org.uk/content/farm-ad-fund>



- 3.6. The site is bounded on three sides by other farms and to the north by an A road. It is opposite Carlisle Airport which has recently secured planning consent to develop the Airport for commercial flights and a large scale forwarding depot for a national haulage firm. We have no reason to expect objections from neighbouring land owners.
- 3.7. Cumbria County Council would be the Planning Authority and we have sought informal pre-planning advice from them. They have advised us about the requirements for securing planning consent and did not identify (at this early stage) any major showstoppers. A key concern will be traffic movements. They also stressed the need for early discussions with the Carlisle Airport developers. The proposed AD site is directly opposite Carlisle Airport which has just received planning consent for a major expansion and development. The County Council were not able to provide formal pre-planning advice in the timeframe due to re-structuring and resource constraints but will be able to do so in the New Year. This advice will be used in evidence for any RCEF Stage 2 application. Four on-farm Anaerobic Digesters have already been successful in securing planning consent in the Brampton area. These range in size 50kW to 500kw. The presumption in Cumbria has to-date been in favour of approving AD plants for consent.
- 3.8. It is not currently possible to export electricity. Grid stability and capacity in the Irthington area is poor. However the developments at the Airport mean that the infrastructure will be strengthened and the capacity increased considerably including a small sub-station planned within 200metres of the proposed AD site. Groundworks started at the airport in December 2014 and the Stobart Group have stated that the construction will take around 231 days to completion. They have agreed a revolving credit facility that will help finance its plans for the airport. Our assessment is that BABE (who would need to be successful at RCEF Stage 2) will take up until the middle of 2017 to secure funding, finance, planning and other consents and then complete construction. This is in line with the current proposals for the Airport development. It is also timely to ensure ENW are aware of the potential demands for the AD as part of their planning for the Airport developments.

4. Anaerobic Digestion: Technology and Operation

- 4.1. Appendix 1 provides evidence of community support for an AD in the wider Brampton area. The concerns expressed were about proximity to residential properties. Appendix 6 shows that any residential properties are over 250metres from the proposed site.
- 4.2. The detailed study (Appendix 4) evidenced the potential for a 2mW capacity AD and BABE have decided to develop a 500kW AD.
- 4.3. The plant will contain the following key components – feed-in systems, digester tank/s; biogas holder; process building; Combined Heat and Power (CHP) engine; digester discharge; digestate storage, mixing system; heating system and storage areas for energy crops.
- 4.4. A detailed design will be produced to go to Cumbria County Council with the formal pre-planning application and be provided as part of RCEF Stage 2 application.
- 4.5. The summary assessment of appropriateness of the site is:



Close proximity to feedstocks	All suppliers within 5km
Availability of grid connection	Development of sub-station at Airport
Suitable distance from residential areas	Over 250m
Close proximity to area where digestate will be utilised	Within 5km
Sufficient land for spreading of digestate	The land owned by all the potential suppliers is in excess of 15000ha
Sufficient space for transportation vehicles	Plant footprint to be designed within 4.2.ha area
Accessible farm tracks/road links for transport of energy crops/slurry	Yes
Not too close to livestock for biosecurity reasons	Site is over 50m from cattle housing and dairy operation

- 4.6. The site is next to the farmstead where modern farm sheds housing dairy cattle have been constructed and more are under construction. The site is described as “till overlying Kirklington sandstone” and is not known to have any load bearing issues or any other geo-technical issues.
- 4.7. The farmer will enter into an agreement with BABE to manage the site and the AD on a day-to-day basis. He will be supported by a competent person and operators. This will create an estimated 4FTE jobs and the opportunity for 2 Modern Apprenticeships.
- 4.8. BABE commissioned a Feedstock Study which reported in February 2014 (Appendix 7). Considerable work had been done with local farmers to identify how much slurry and other farm losses they could supply and the implications for any AD. The key sensitivity with any AD is feedstock security. This is in terms of quality, quantity and supplied price. Having this detailed and current Feedstock Study was a sound building block for this report. The only issue was that the Feedstock Study was based on the plant being located at Townfoot Industrial Estate in Brampton. We have therefore re-visited this report and talked with farmers within a 5km radius of the proposed location at Irthington. Appendix 4 details the rationale for confidence about security of feedstock supplies.
- 4.9. Entering into exclusivity and supply agreements with the farmers will be essential before any discussions about finance can be progressed and this is identified as a key step in Section 5.

5. Sustainable Farming

- 5.1. One of the conclusions from the community consultation is about the need for “sustainable feedstocks”. The Common Agricultural Policy (CAP) reforms which are about to be introduced will mean many farmers (as part of the greening measures) will choose to return to active programmes of crop rotation and less intensive agricultural practices rather than lose subsidy. Monoculture cropping has been prevalent for a few decades and is responsible for many of the problems associated with soil erosion. Crop rotation will improve soil structures, water retention, decrease need for chemical fertilisation and contribute to climate change mitigation. These crops would not necessarily be suitable for feeding to stock and therefore defined as farm losses. The EU’s policy to also encourage



less intensive farming with reduced stock holding means that land currently used for feeding stock may become redundant and again represent farm losses. This is happening at a time when farmers' profitability is at its lowest since the 1930s. "Farmers need to work in a way in which it is economically sustainable – so that farmers have a long term future in the business whilst maintaining (and improving) the environment and contributing to the social success of rural communities and the success of the countryside as an area which the rest of us can enjoy" (www.ukagriculture.com). An AD will provide a market for the farm losses and a means of improving farm economics. An AD will contribute to farms being more sustainable in the long term. BABE has indicated their intention to use sustainable feedstocks as far as possible.

6. Energy Export

6.1. The key limitation is that currently it is not feasible to export electricity to the grid but as described above this issue will be resolved by the consented development of Carlisle Airport. Another is that to-date we have not identified a market for the heat that will be generated by the AD other than limited use on site and at farmstead. BABE intend to pursue discussions to see if there is potential for a community project especially around heating polytunnels for vegetable growing and thereby contributing to food security. Any heat network for this type of development would be "soft-dig" and therefore more affordable. They will also enter into early discussions with the Airport developers to explore any potential uses for heat. Taking heat to the airport would require "hard dig" under an A road but this road is going to be enhanced to enable the Airport Development so there may an opportunity to incorporate with this work. Beyond the road it would be "soft dig" with the existing Airport Buildings within 250m. The Plant design costs include a District Heating point for the prospect of a co-located development with corresponding sales (Section 4) but no assumptions have made about costs or income of supplying heat to the Airport.

7. Feasibility

- 7.1. AD is a proven technology. There are 7500 AD plants in Germany with an average capacity of 350kWe. However in the UK there are only 136 operational plants. This is a limitation as there are only a few UK based AD manufacturers/suppliers.
- 7.2. Brampton is surrounded by agricultural land which gives confidence about feedstock supplies and security. There is also rough grazing land that could be rented by BABE.
- 7.3. It will be potentially feasible to export the electricity generated to the national grid because of the consented development of Carlisle Airport.
- 7.4. The community and the airport development offer up opportunities for affordable heat networks using what would otherwise be a wasted by-product (after parasitic use) from CHP.
- 7.5. AD is unique as a renewable energy technology because it can provide baseload having the capacity to generate and export 24/7/365 and will enable BABE's aims to be a net exporter in the next 20+ years.
- 7.6. A 500kW AD development is therefore feasible in terms of location, feedstocks, export of electricity, local heat sales and access.



Section 4: Financial Projections

1. Introduction

1.1. The following outlines the financial models for both the proposed Solar PV and AD installations. At this stage these are designed to give an idea of the financial viability, as far as possible, at this early stage. This Section addresses the key considerations identified in the RCEF Stage 1 Checklist.

2. Solar PV

2.1. The recommendation is for a ground mounted 100kW installation at Townfoot Industrial Estate. In reaching that conclusion the financial projections were considered and the fact that there was little difference between a ground mounted and the roof mounted options was a critical consideration.

2.2. The assumptions behind the financial projections are:

- 2.2.1. Electricity purchase rate 12p
- 2.2.2. Exporting 50% electricity
- 2.2.3. Using 50% on site
- 2.2.4. 2.5% RPI inflation
- 2.2.5. 2.5% annual energy price increases
- 2.2.6. No structural work required
- 2.2.7. Standard scaffolding and access towers used
- 2.2.8. All roofs South facing and 10 degrees
- 2.2.9. No shading on roof or ground systems
- 2.2.10. Tariff = 13.03p per kWh for each of the 10 x 10kwp systems
- 2.2.11. Tariff = 10.71 per kWh for the 100kwp system

2.3. The estimated costs of the two options are:

Option	Solar PV Solution	System Size wp	Price before VAT	Price Inc VAT
1 Roof Mounted	10 x 10kwp Systems (separate meters/MPAN's)	100000	£102,429.00	£122,914.80
2 Ground Mounted	100kwp Ground Mount system	100000	£116,959.00	£140,350.80



Expected generation:

- Ground mount pitched at 30 degrees - roof mount assumed at 10 degrees
- Roofs may not all be South facing so may be further reduced on generation

SAP 2012 Output Ratings - MIS3002 v3.1			
Region	Tilt -->	10 Roof 30 Ground	Shading Factor-> (segments in shade)
8E	Orientation -->	0	0
Option	System Size wp	SAP 2012 Output Rating (kwh)	Annual FIT Income
10 degree S Roof	100000	79,300.00	£10,332.79
30 degree S Ground	100000	87,000.00	£9,317.70

Expected Returns:

- 10 separate systems with a higher feed-in tariff will deliver a better ROI but we need to weigh up the generation losses for any roofs that are not orientated Due South.
- The Ground mount system delivers most electricity so if more than 50% is consumed on site will then this will help make up the difference in install costs vs returns.

Option	Estimated Annual Power Output (kwh)	Feed-in-Tariff Rate (per system)	Year 1 FIT Income	Year 1 Export Income	Year 1 Power Savings	Total Year 1 Benefit
1	79,300	13.03	£10,332.79	£1,891.31	£4,758.00	£16,982.10
2	87,000	10.71	£9,317.70	£2,074.95	£5,220.00	£16,612.65

Option	Payback over 20 years (incl. RPI and Energy Rise)	CO ² saved per annum	Estimated ROI Year 1
1	£355,207.25	43139.20	16.58%
2	£342,188.61	47328.00	14.20%

These financial projections demonstrate that either option could be financially viable. Each of these projects produce a financial return that should enable BABE to secure finance from banks such Triados, Charity Bank, The Yorkshire Fund etc. if BABE was unsuccessful in raising enough investment through a community share issue. Research has identified that 40% of the community would be interested. Community owned Solar PV a “well-trodden path” with a successful track-record which will give confidence to investors and others. It is also a proven technology well known to most



people.

3. AD

AD is a less well known technology which is perceived to be in its infancy and to have a key sensitivity due to its dependency on feedstock supplies that can vary year-on-year due to weather and other factors and yet have a direct impact on biogas yields. In order to get an idea of the financial viability at this early stage we have used the DECC funded modelling tool – NNFFC AD Calculator³. The detailed financial assessment for a 500 kW AD is in Appendix 8.

The IRR of 13.9% and ROI of 16.29% will give traditional investors and financiers some confidence and go some way to meet their expectations. However securing investment and finance will still be a key challenge. BABE understands that a successful application for RCEF Stage 2 will enable them to produce a detailed Business Case and Investment Plan for discussion with the appropriate range of investors and banks. It will also enable them to investigate “crowdfunding” opportunities such as Abundance. A community share issue would also be launched.

With an estimated development cost of £2.209million BABE realise they may need to also investigate shared ownership models. They have welcomed The Shared Ownership Taskforce Report (produced for DECC as part of Community Energy Strategy work) as this is pertinent to potential business models for the AD. Fundamentally the Taskforce Report concludes that “the amount of the project that should be offered for shared ownership should be appropriate to the size and commercial viability of the project”.

The potential income of £865,579 is broken down showing FITS, RHI and electricity sales in Appendix 8. The Non-Domestic RHI reflects an estimate of sales of heat to a co-located community polytunnel/other project. The projections include a cost of £100,000 for the heat infrastructure. If this did not materialise the impact would be to reduce estimated income by £48,637 per annum.

The likely running costs of the installation are £183,382per annum. The lifetime of the project will be 20years so the lifetime cost will be £3,667,640.

The likely outgoings including loan repayments, staffing, insurance etc. are £32,325 per annum. The lifetime cost will be £646,500.

The estimated surplus per annum which can be spent on local community benefits will be determined by the final ownership models and what those mean for Investment and finance. The overall surplus per annum will be £289,460 but this must be caveated as, our experience would say that, the plant will inevitably be in shared ownership. BABE have concluded that if this level of surplus was achieved on a shared ownership model that they would aspire to put £60,000 per annum towards community benefit.

³ www.biogas-info.co.uk



Section 5: Proposed Scheduling

1. Solar PV: Next Steps

- 1.1. BABE have agreed that the ground mounted Solar PV project at Townfoot Industrial Estate is a viable community energy project with minimal risks because it has community support; host support; no need for Planning Consent; has proven examples of community ownership and investment (Brighton, Westmills etc.); proven technology and financial modelling; and day-to-day limited operational and maintenance requirements.
- 1.2. For these reasons their current preference is to take the project forwards themselves without support from RCEF Stage 2. The Action Pack produced by NEA/ACE and Local United⁴ gives an invaluable explanation of the experience in Brighton. BABE also have the confidence of knowing that they could seek free peer support through Community Energy England (they are Members) and the Co-Operatives UK Energy Mentoring Scheme.
- 1.3. BABE has an active database of over 300 contacts and evidence that 40% of the community would be interested in investing in community energy generation and that Solar was the technology the community were most supportive of. This will be a strong base from which to launch a community share issue. The first step could be to launch a “Pioneer Share Offer” to raise some start-up capital and then to launch a “Pledge Scheme” particularly targeting their existing database. Brighton raised £100,000 in pledges which they then converted into community share issues. This staged approach enables education and awareness raising as well as future-proofing any community share issue.
- 1.4. Along with the experience of community organisations there is an invaluable resource in the Community Shares Handbook⁵. As an IPS trading for benefit of community, BABE has the best organisational structure for a community share issue.
- 1.5. BABE will need to pull together a Business Plan including an Investment and Financing Strategy; secure grid connection and re-open discussions with landowner.

2. AD: Next Steps

- 2.1. Developing an AD at scale is a much riskier and complex venture for a community organisation. The capital costs will mean the need to raise finance and this is difficult for commercial organisations far less community organisations. Applying to RCEF Stage 2 and being successful will be critical to BABE in moving this project on. To strengthen their case BABE would in the New Year seek formal pre-application advice from Cumbria County Council; do local detailed consultation in the Irthington area; listen to and take any appropriate action on feedback from WRAP on Stage 1 Initial Feasibility Report.
- 2.2. The Feedstock Study (Appendix 7) identified the potential for BABE to lease rough grazing land from absent landowners which would reduce the difficulties of negotiating long term (10 Year) feedstock supply contracts which could be required to satisfy lenders. BABE would like this investigated further as part of actions at Phase 2.
- 2.3. The following Schedule identifies the key actions they would take to deliver project.

⁴ Community-led photovoltaic initiatives, NEA/ACE/Local United, 2014

⁵ Community Shares Handbook, Community Shares Unit (updated 24/07/14)





Section 6: Conclusions

The Rural Community Energy Fund was set up by Department of Energy and Climate Change (DECC) and Department for Environment, Food and Rural Affairs (Defra) to further three key aims:

- Promoting Rural Growth and Job Creation;
- Supporting Communities; and
- Enabling Renewable Energy Growth.

The Initial Feasibility Study into community energy generation in Brampton has identified that 93% of the community are supportive of BABE's aims to generate renewable energy for the benefit of the community. Looking at the range of realistic and deliverable options Solar PV and Anaerobic Digestion have been examined in more detail. It is likely that both would secure community support, get planning and permitting consents, and be financially viable. These conclusions are drawn principally from:

- The evidence gathered from quantitative and qualitative research undertaken into community support;
- The "in-principle" support of farmers around Irthington and the assessment of the feedstocks they could supply to an AD;
- The "in-principle" support of businesses on Townfoot Industrial Estate in Brampton for a Solar PV development that would supply them with some of their electricity needs;
- The "in-principle" support of landowners;
- The informal pre-planning advice from the relevant Planning Authorities;
- The informal pre-planning advice from the Environment Agency about permitting; and
- The initial assessment of financial viability.

The report also demonstrates how this project would contribute to the aims of DECC and Defra. The project would create 4 FTE jobs and 2 Modern Apprenticeships and safeguard jobs. It would also give the community access to the profits created by the project through an individual return on investment (Community Share Issue) and a direct return to the whole community for community projects. The process would enable BABE to continue to grow and enhance its capacity to deliver on community energy projects – generating, reducing, managing and purchasing.

600kW capacity installations in the Brampton area would contribute to the Government's aim for communities to have installed capacity for between 0.5GW and 3GW by 2020. It would also enable BABE to make a step change in delivering their aims to be a net exporter of energy.

BABE's next steps are to progress the low risk ground mounted Solar PV installation and to submit a RCEF Stage 2 application for the higher risk AD installation.

These two installations are ambitious but the scale of the rural community both in and around the Market Town of Brampton makes them appropriate to the local need both for energy and for community benefit. This Initial Feasibility Study will give both BABE and the community confidence in moving forward with their aims for community energy.



Appendices 1-8

Appendix 1	Community Consultation Report
Appendix 2	Stakeholder Consultation
Appendix 3	Steering Group Presentations
Appendix 4	Renewable Energy Resource Assessments
Appendix 5	Townfoot Industrial Estate
Appendix 6	Irthington AD Site
Appendix 7	Feedstock Study
Appendix 8	AD Financial Analysis