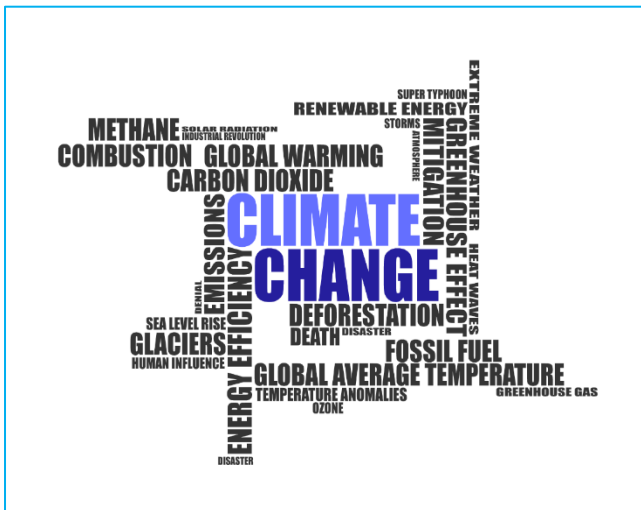


RCEF Stage 1 Feasibility Study

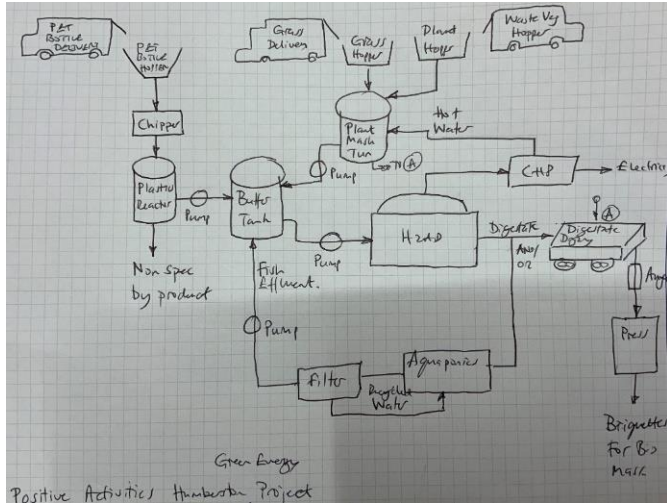
Anaerobic Digestion (AD)



www.Humberston-ECC.org

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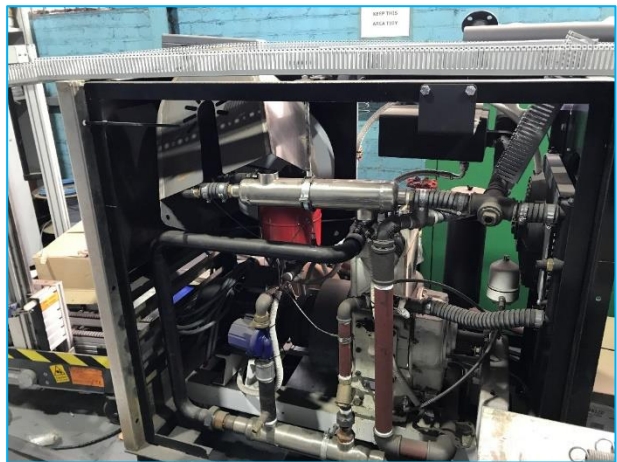
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1 Executive Summary

Humberston Eco Conversation Centre (ECC) is a unique “off grid” 15-acre site only 15 minutes from Grimsby Town Centre.

Our aim is to create a welcoming eco-friendly open space, where visitors can enjoy the benefits of outdoor education, fun family recreation and the delights of being one to one with wildlife and nature.

Our vision is to develop a fully accessible and managed site which will educate and act as a hands-on showcase of renewable energy technologies such as a **community led anaerobic digestion waste to energy project**, battery storage, wind, solar PV, and green transport all of which help to promote a cleaner, healthy environment.



For more online development pictures

www.positiveactivities.org/nelc



This innovative community led project will be a place:



- Which is Covid-19 safe
- Is a 15-acre rural site only 15 minutes from Grimsby Town Centre which will be 100% off grid within 5 years.
- Is a community led development which is preserved for current and future visitors.
- Which provides quality recreational, educational / research and development opportunities within a safe “off grid” environment
- That promotes environmental sustainability by showcasing several different renewable and energy technologies are created energies for social purpose
- That provides quality recreational activities and facilities for all ages and abilities which improve their social, mental, and physical attributes
- A place where green energies will be used to grow sustainable foods and micro herbs which will assist to reduce carbon emissions through a reduction in transport
- Where visitors can enjoy and take part and assist managing a wide range of conservation and wildlife initiatives
- Where users can partake in community projects such as Green Gym which promote a healthier and more active community
- Which provides an ecosystem which is a haven for wildlife for the benefit of people to enjoy nature
- That is managed in a sustainable and environmentally sensitive way
- A place for the benefit of present and future generations
- A place where visitors of all ages and abilities can learn about green renewable energy technologies
- A place for the people of all communities regardless of age, ability, ethnicity, or creed.



Installation of solar PV with Battery backup



Containerized anaerobic digestion unit

2 Community Engagement

Over the past 3 years we have consulted with local residents, community groups, commercial business leaders and our local authority to develop a new 15 acre rural “off grid” site into a world class showcase of innovative renewable energy / green technologies integrated with fun amenities, community led energy and conservation projects.

Our Mission:

Within 5 years we wish to have created a 15-acre rural community led amenity space in North East Lincolnshire, which is **100% “off grid”**.

Consultations

Our extensive consultations with residents, community interest organisations and commercial companies and their comments helped us co-design this unique, ambitious, and challenging project. More recently we have continued with that ethos but with a specific focus on “off grid” renewable energy technologies. As a part of the RCEF feasibility study we originally proposed to hold 2 public consultation sessions at two local venues to an audience of approx. 100 each.



Due to Covid

-19 restrictions however this was not possible, so it was agreed with Ruth to use online social media to request feedback from the local community. Our Trustees decided therefore to gauge the reactions of a



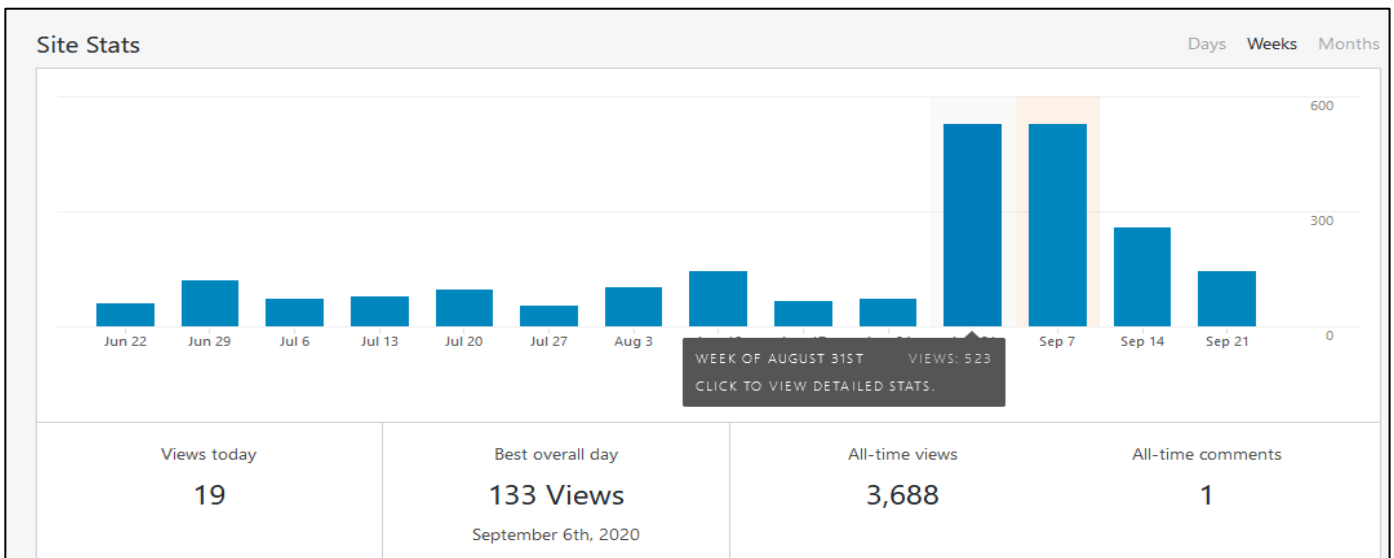
AD Unit Workshop

FEBRUARY 20 2019

much wider audience of businesses, local community groups and residents through Facebook as this sector of social media which is widely used in the borough.

A media expert was employed which, although expensive, proved to give a more immediate and dynamic reaction far beyond our original expectations. (See screen captured image) and the link to the live Facebook site which will furnish up to date statistics. <https://www.facebook.com/HumberstonECC>

The overwhelming reaction after the launch of the social media Facebook site also meant that our project was able to seek constructive opinion, concerns, and secure new volunteers with specific interests around renewable energy technologies activities and conservation projects. In fact, the launch and subsequent engagement has directly led to an additional 15 new volunteers and hopefully soon the recruitment of an experienced community focussed MBE who will be joining our expanding board along with African Goodwill Ambassador Clifford Spencer



Screen capture of weekly views of Facebook site

Specific AD focussed consultations

The consultation highlighted minor concerns about transportation of feedstock which will be addressed as part of the planning application, and will be added to our FAQ page on the website www.Humberston-ECC.org

3 Community Benefit

We will develop combined heat and power resources using several renewable energy technologies to provide clean green energy on the site, not for commercial profit but for social benefit.

Our Humberston site will have offices, public Wi-Fi and VOIP communication technologies, a community managed café, ladies, and gents' toilets its own bore water supply, a toilet bio digestion system, a roadway, a comprehensive travel plan, an EV charging point, safe parking for bicycles, all supported by safe green renewable energy technologies. We estimate a minimum of 2000 visitors to site per year who will benefit from all the activities and amenities on site with a further 300 + via our digital and off-site outreach programmes.



We will use and showcase several affordable and sustainable green energy technologies such as wind, solar, battery, generator, heat / air source, anaerobic digestion, geothermal etc all managed by local volunteers who will be trained to educate our visitors as well as safely provide sustainable energy on site for social purpose.

We will also become the first project in the North East Lincolnshire region to develop a **community-led Anaerobic Digestion project**, recycling waste to energy. We have been gifted one of only 3 small-scale H2AD modular portable units in the world. Feedstocks such as grass clippings, spent hops, spent coffee etc can all be processed in the unit, which will create, bioenergy and a fertiliser.

With our partners [GBTF \(Global Biotechnology Transfer Foundation\)](#) and Hull University, this natural AD process with the use of specialist microbes sourced from Japan, may be able to process **single use PET waste plastics to create energy**. It is because of RCEF support that our innovative project will be the first in the world to trial waste PET plastic as a feedstock to create energy for social purpose and already this project has attracted a great deal of UK and international attention.

We are proud to be working with the [GBTF \(Global Technology Transfer Foundation\)](#), Hull, Liverpool and Surrey Universities, Lindhurst Engineering, Cool Energy, E.on, our own Local Authority SMART and IfaS Teams amongst many other partners. We are also pleased that our Humberston Eco Conservation site hosted the very first meeting of the newly formed UNA (United Nations Association) Greater Lincolnshire which is affiliated to the United Nations. Our role, like that of our site, is to promote the [17 SDG's \(Sustainable Development Goals\)](#) to the community, educational establishments, and businesses so we can all make a difference to the place we live, work and play.

We expect being ready to commence trialling the plastic waste as soon as we have completed a second feasibility study and public consultation, satisfied any planning, environmental and legislative requirements and once the unit is fully commissioned.

If the AD unit project goes forward there is potential to create two part time jobs for the operation of the unit, with a further opportunity for educational workshops to share the knowledge to the local community, increasing awareness and interest in Anaerobic Digestion (AD) as an energy source.

Demonstration of different plant-based feedstocks

Positive Activities site and activities relating this renewable energy scheme has the ability to reach out to the wider farming, conservation, and amenity communities to demonstrate the types of plant-based feedstock's (including experimental and nectar rich flowering plant mixtures) that can be used for biogas generation.

One approach may be to have a parallel classroom or laboratory linked to education about biogas and other renewable energy sources. This could be a test bed for experimentation (such as on plastic digestion) using small digesters, which are the next step up from the lab bench scale, for group activities.

4 Technology

AD-DV Limited are specialist consultants in anaerobic digestion and have produced a report on the feasibility and challenges of siting a micro anaerobic digester on the Humberston site.

Methodology

The report was compiled through reference to government legislation and interaction with government agencies such as the Environment Agency. The process also included extensive conversations with the technology manufacturer, Lindhurst Engineering, potential stakeholders such as feedstock suppliers and a network of contacts within the industry.

Digester

The digester to be used for this project is a novel micro anaerobic digester, H2AD, built and donated to the site by [Lindhurst Engineering](#). It is a 3 m³ digester with a 5 m³ gas envelope. The unit is a prototype, designed in such a way as to make it simple to operate and maintain. The digester requires additional equipment for feedstock processing and conversion of the gas into energy. The close relationship with Lindhurst Engineering has been profitable in this respect. Lindhurst are willing to donate the feedstock processing equipment in the form of a macerator, and a combined heat and power engine (CHP) to convert the gas to electricity and heat. The CHP is also a prototype as engines of this size are not commercially available for use with biogas. This would make the site important from the point of view of showcasing renewable energy technology.

The energy requirements for the unit will be around 4 kW per day, which will be catered for by the unit itself once it is operating. In conjunction with other renewable technologies, either already in place or planned for the site, there should be no issue in with continuous operation of the unit.

Feedstock

To simplify the process and to reduce the legislative and administrative burden on the site, it has been decided to use only green wastes for the feedstock. The primary waste will be grass clippings which can be sourced from local sports facilities, Grimsby Golf Club have already expressed a willingness to supply up to 10 tonnes per week of grass clippings during the growing season, this will be far more than what is needed. The local authority has also been approached to supply grass clippings, but the Covid-19 crisis has led to delays in replying. Additional feedstock could be in the form of waste fruit and vegetables from local farms and shops.

Green wastes are seasonal by nature so provision will need to be made for off peak times. Positive Activities have strong ties with the local farming community and some land may be available for setting up a small silage clamp to preserve some of the excess summer grass as the winter feedstock.

Without specific testing of the feedstock it is impossible to know what the actual energy output will be. The closest estimate can be achieved by using the nearest equivalent such as silage effluent. Estimates suggest an output of between 40 and 100 kWh of electricity per day. This estimate requires several assumptions to be made and the true output at the Humberston site will only be determined through operation.

By-products

The primary by-product of anaerobic digestion is digestate. This is used as a readily available nitrogen source, which can be used on site or on farms so the local farmers would provide a ready outlet for this material. Although this is not a saleable commodity it could be given to local allotments and gardeners clubs as a means of fostering stronger community ties. The digester would produce a maximum of 1 m³ per day and farmland spreading regulations allow for the application of 50 m³ per hectare per year so local farms could easily accommodate the volumes produced at Humberston.

Another by-product will be fibrous material from the processing of the grass. This fibre can be composted and used on site or, again, offered as a community resource.

There are opportunities for enlightenment, education and training and development linked to the AD unit and any associated 'discovery' lab-based activities, participatory learning, school projects and research opportunities for a wide range of age groups.

In some cases, with adults our energy workshops can also have many social benefits in terms of interaction and group learning and experimentation.



With a plant based micro AD unit this can link in with other activities such as vermiculture and experiments with hydroponics, aquaponics and other plant growing activities including our very own [Green Gym project](#).



Initial examples of best practice from other community biogas projects – some using purely plant-based feedstock are cited in background research for this project. Community activities may contribute to design of the ancillary equipment and layout or similar projects elsewhere. Examples of successful community lead renewable energy projects such as that at Ashton Hayes, Cheshire is cited in the background research.

Technology Safety

Operator

It should be recognized that in relation to conventional anaerobic digestion equipment this unit is very small and represents a minor hazard. That is not to say that the risks can be ignored.

As previously mentioned, the unit has been designed to be easy to use and maintain. The unit will be installed and commissioned by Lindhurst Engineering who will also train the site staff in its operation, no one will be allowed to operate the equipment without full training. The Environment Agency also requires the site to demonstrate competence in the operation of the equipment and site safety. A full complement of standard operating procedures and risk assessments will need to be produced.

Operator maintenance is limited to the replacement of some peristaltic pump hoses, beyond this maintenance and repair will be carried out by trained engineers.

Pollution

The risk of pollution from this unit is very small. In the event of a failure the maximum leakage would be 3 m³, which should be easy to contain with a suitable bund. In practice the unit comprises two 1.5 m³ (about twice the volume of a large refrigerator) tanks and the likelihood of both failing is small.

Gas production is relatively small and will be contained within the envelope or burnt immediately. In the event of a failure, gas would be released via a burst disc to the atmosphere and dissipate quickly. Stored digestate could produce small quantities of gas and the report suggests potential methods for filtering the excess gas from these containers to prevent odors.

Legislation

The site will need to apply for appropriate permits and exemptions, which are detailed in the appendices to the full report, and an application will need to be submitted to the Environment Agency to determine which permits and exemptions apply to this site. These permits will stipulate quantities for storage of feedstock and digestate on site as well as what can and cannot be processed.

Financial Projections

Although the project will produce an energy output there is no financial benefit from this planned at this stage of this unique project, as the energy produced, as we implement various green energy technologies, will be used to power community cabins, public WiFi, our toilets digester and running water from our bore hole.

As the project has a nearby 400 home residential development being built by Persimmon Homes, we wish to explore in far more detail the possibility of the site benefitting from renewable energy incentive schemes. A community led initiative putting energy back to the grid would make the site a financially sustainable development.

5 Financial Projections and Estimated costs

To implement stage 2 of our project is estimated to be **£96,500** across the following key disciplines.

Project Management/Business Plan - Positive Activities

Administration - Positive Activities

GBTf (Global Biotechnology Transfer Foundation)

NAC (National Aquaculture Centre).

Architect - Associate of Dieter Nelson

Town Planning Consultant - Dieter Nelson Planning Ltd

Planning Application – North East Lincolnshire Council

Solicitor/Legal/Accountant – Weaver Wroot

Grant/Funding Specialist - TBC

HSE Consultant - TBC

AD Technology Consultant - AD-DV Ltd

AD Unit Supplier/Commissioning Specialist - Lindhurst

Energy/Technology Consultant - Cool Energy Ltd

Project Planning Consultant - Beckett Planning Solutions (BPS) Ltd

Operator Training Provider - TBC

Operational / Contingency Costs

6 Planning & Permitting

Primary investigation through contacts with NELC planning officers indicate that full disclosure of amounts to be processed, along with waste concerns, increase in road use, and visitors will all need to be further assessed prior to any planning application being submitted in order to satisfy any planning objections, as will any waste licenses which may need to be sought.

As the equipment however is of a low volume producing order, our consultant in the research and reporting indicate that there will be little or no pollution nor environmental impact, in normal operating conditions, once full commissioning has been completed. Accurate figures will be produced during the commissioning phase of operations.

Full site risk assessments and method statements for work processing will be completed by an IOSH Chartered H&S Consultant as part of the commissioning process. The Consultant also has 30 years of industrial technology practical experience prior to moving into H&S on a full-time basis.

All these can be produced at the planning stage to prove production safety. Any permanent fixings to ground will need to be covered by planning applications. At present, all equipment will be removable, and any excavated ground would be returned to a natural condition within a short timescale if needed.

Exact traffic figures, and trips on and off site for input materials and output waste materials being given locally will not be available until the project has completed full trials for throughput.

Local planning committee members will be invited to visit site to assess the digester once trials have been completed, prior to full planning application for project runs.

Environmental issues

Environmental issues were researched in relation to the H2AD micro AD unit and indicate there are likely to be few problems associated with the installation and operation of a micro AD unit. Because of its small size it has a relatively small output and our detailed research through the feasibility study has led to the conclusion to use only plant-based feedstock.

Crop residues or energy crops if used, do not need registering. Lawn mowing's such as golf course clippings and fruit and vegetables past their sell by date are classed as waste so on-line registration is required with the Environment Agency for T25 and U11 exemptions. They do not need to be contacted in person. (T25 and U11 governs anaerobic digestion waste treatment)

A T25 exemptions allow you to store or treat up to 50 tons of feedstock at any one time.

The U11 exemption allows you to spread waste on non-agricultural land to replace manufactured fertilizers or virgin materials (such as lime) to improve or maintain soil". You can spread 50 tonnes per hectare per year and store up to 200 tonnes

Incoming plant feedstock can be stored sheeted to be ensiled in concrete pens. Care is needed to check incoming feedstock and removing any contaminants such as plastics and metals. This requires manual checking, which can be time consuming. There are risks of varying or experimenting with feedstock entering

the digester, which must be considered. Plant material may require maceration to break down material to digestible particle sizes.

These feedstocks are largely uncontroversial. The only environmental issues may be linked to the number of trips needed to drop off feedstock such as grass clippings. Careful programming can minimize the number of deliveries and it may be possible to consider innovative or green means of transport to collect the feedstock. (Anything from electric transport to bicycle powered transport for smaller consignments has been used elsewhere).

The AD unit produces about 1 cubic metre of digestate a day. There is a need for on-site storage – even if local farmers collect and store digestate on their site – particularly in the winter months. The main problem is to check designs of storage containers to ensure that they do not leak (It is important to take on board any lessons from the Harper Adams University digestate store leak. There is a need for a bund around the digestate storage tank to reduce the risk of leakages causing environmental harm on site. Waste storage must be at least 10 metres from a watercourse and 50 metres from a spring, well or borehole

The store must be big enough so as not to act as a ‘pinch point’ preventing the digester from running due to lack of storage capacity for digestate. The storage tank should be fitted with a carbon filter as a safety measure. It is important to maintain the AD units operating temperature during the winter. The digester can be protected by insulation or by incorporation in a building.

Use of the digestate

Our 15-acre site where the AD unit will be located, is surrounded on 3 sides by farmer’s land. Therefore, a partnership with them has the potential for us to deliver fertilizer digestate direct to them significantly reducing the need to transport via the main roads.

Extra storage capacity may need to be factored in on the farmers land using the digestate if they are agreeable and if funding is available. Farmers using digestate spread during the active growing season could be members of a co-operative or club and pay a nominal fee enabling traceability and record keeping. Waste must be stored in a secure location before it is used It may be possible to tweak digestate too increase soil micro biodiversity.

7 Site

ECC Is located off Humberston Avenue and Clubhouse Way. The ECC site covers approximately 15 acres of land that Positive Activities Charity owns and manages. The nearest postcode for the site is: DN36 4SQ. Our What3Words address is: //tigers.bunk.daisy.

Located Approximately 5 miles from the town centre of Grimsby. Millennium Farm is situated in the Rural village of Humberston, and is easily accessible from Grimsby, Cleethorpes, New Waltham, and surrounding villages by Foot / Cycle. There are also various footpaths giving access to the site on foot. Alternatively, the site is accessible from the South by many well-signed footpaths, leading from Walk Lane Humberston, or from The Church in Holton Le Clay.

Car

Traveling from outside the Grimsby Area follow the A180 into Grimsby and at the third roundabout turn right taking the third exit onto Victoria Street. Follow this road until you reach another roundabout Turn Left here. At the 1st set of Traffic lights turn right onto Peaks Lane, and go through the village of new Waltham and upon reaching a small roundabout turn Left onto Humberston Avenue, continue for approx. half a mile and the entrance to Millennium Park is on the right-hand side.

Public Transport

The site is accessed via a public footpath, running from Humberston Avenue. Stagecoach offer a regular Number 8 service, with a bus stop just a few yards from the footpath entrance.

AD Unit siting

There are several places on site that the Anaerobic Digestion (AD) Unit could be sited, which would be subject to Planning Permission Application which if successful, would be implemented during RCEF Stage 2.

8 Operation & Governance

“Governance” has a multitude of different meanings. A recent paper on biogas used the term a process “undertaken by governments, market actors, voluntary organizations or networks that aim at steering formal or informal organizations, or territories, through laws, private certification, standards, or norms to achieve specified outcomes” According to one author cited - governance is closely associated with the term of “sustainability” It is important to use governance mechanisms to ensure successful market introduction, but also precautionary management to avoid undesirable environmental, economic, and social side effects. Metrics for sustainability measurement include focus on measuring or assessing environmental aspects, such as GHG emission savings, impacts on soil quality and fertility, and emissions of pollutants to water and air.

As a key part of our business growth and development we will expand our board to bring a wealth of specialist expertise, strategic guidance and international connections and we expect to announce some new members shortly.

With our HSE team and our technology specialist we are 100% convinced that we can design, monitor and implement a safe community led training programme where trained volunteers, and graduate students etc will safely operate all aspect of the sites power, conservation and on-site family activities. We have ample evidence of how place based social action works and when people are motivated to make a difference to our environment and themselves we get a far greater desire to become part of a team which will monitor and identify what impact they are making.

We will develop a safe H2AD Anaerobic Unit training program for the operation of the digester, pre-AD digestion and post digestion processes.

Organic waste needs and supplies

- 1, Feedstock supply chain - Positive Actives via collaboration with local farmers, nearby housing development, via local suppliers of out-of-date fruit and veg and or via the area nearby golf courses.
- 2, Store supplies in a silage clamp underneath sheeting in bags until needed.
- 3, Check feedstock coming in for foreign material that could affect operations and must be removed to prevent machinery being damaged.
- 4, Reduce material to a size that the digester can cope with prior to using in the H2AD system.
- 5, H2AD unit consists of a premix tank for material of the optimum size for digestion. Maximum retention time in the digester is about 3 days, (72 hours (about 3 days). Based on microbial fuel cell technology. The process can be monitored remotely

Use of Digestate

Establish contracts with local farmers possibly in a 'club' to allow monitoring use of digestate. Digestate must only be applied during the growing season on either Positive Activities land or on farmers 'club members' land. Nutritionally adjusted liquid digestate can be used in Aquaponics systems where members of the community will grow nutritional plants and micro herbs. There are also various options for using solid digestate including composting.

9 Scheduling

Beckett Planning Solutions (BPS) Ltd who are specialist in project planning provided the project plan.

The planning software used was Primavera P6 Professional owned and operated by BPS Ltd.

The project plan Start date was 02/09/19 with a proposed Finish Date of 01/07/20 with final payments by 30/09/20.

Covid-19 caused a delay to delivery of the plan, which has resulted in a new Finish Date of 30th Sep 2020.

Covid-19 changed the Public Consultations from two public gatherings to an on-line survey agreed with RCEF.

How the plan was constructed

The project plan for the RCEF Stage 1 Feasibility Study was built during 2019 through input from the team and from the RCEF Stage1 Feasibility Report Structure document. It was built in a standard project layout using a Work Breakdown Structure (WBS) for the hierarchy, with activities, dates, durations, resources, and calendars forming the base data. The base data was agreed with the team and then inputted and used to allow scheduling from the Data Date.

The Data Date was the new date when the plan was updated with progress and re-scheduled.

Progress Monitoring and Plan Updates

Progress information was collected by BPS Ltd via face-to-face meetings, and then post Covid-19 via telephone conversations, on-line video calls and emails. The progress was entered and the plan re-scheduled. A copy of the latest plan was uploaded to the RCEF Shared Area bit.ly/32bsgp2

Exerts of the master plan were filtered by Individual and issued to each respective individual to focus on just their activities. These were uploaded to the individual's folder in the Shared Area.

The plan was amended because of Covid-19 to replace the Public Consultations with an on-line survey.

Feedback & Lessons Learned

Feedback from the teams as to the effectiveness of the project plan was that it gave a clear and concise list of activities to be done. Feedback from Dr David Vaughan – AD-DV Ltd received 13-09-20.

“I found the defined plan very useful with project categories and subheadings. In addition, the projected time expected on each section and percentage complete are useful. I realise these are a little arbitrary as we decide what these parameters are, but it does help to keep you on track.

It was well explained and easy to follow, it was helpful to have the individual excerpts separated out for ease of knowing what was required as well as how it fits into the whole project.

The updates were sufficient for the nature of the project and the problems with Covid 19.

The flexibility to alter plans and move thing as needed is helpful and required in a project of this nature and under the Covid restrictions.”

Scheduling Conclusions

The use of planning specialists and software for RCEF Stage 1 has been a positive, in the delivery of the project.

It is recommended that the same course of action be followed if successful with RCEF Stage 2 application.

10 Conclusions

Community Engagement & Benefits

There is overwhelming evidence that community led waste to energy projects would successfully engage with communities who want to make an impact in the place they live in. We were able to build on previous experience from undertaking the [EU Horizon 2020 ISABEL](#) project and apply some of the learning specifically to this project.

This included outlining successful methods of community engagement learnt from others of the role vegetable feedstocks can play in a range of community activities, including compost making, vermiculture, aquaponics, biogas research and education outreach, linked to workshop sessions.

One important role for the biogas plant is to raise awareness, inform and educate about the role of biogas at different scales for community and its potential role for larger scale users. It could have an important role as the UK leaves Europe and domestic policy evolves and there is need to inform and update new policy makers.

Of the important factors is the need to re-iterating the multiple roles of biogas over and above energy, generation in terms of waste processing and feedstock for other processes such as the aquaponics. This is important when comparing with other forms of renewables such as solar and wind. This can be done by word and on-site demonstrations / workshops.

Our project promotes and encourages a community led model which would bring a wealth of long lasting social, economic, and mental / physical health and wellbeing benefits to residents, communities, business, and to our environment.

The AD unit will provide the site with a relatively small energy output, ideal to power our low energy Aquaponic units and perhaps a small research and development unit. The Aquaponic unit will be managed by members of the community to grow fresh clean efficient fish protein and pesticide free highly nutritious salad vegetables and micro herbs for the community. The residual waste by product, is nutrient rich water from fish for plant production which is also a natural fertiliser.

Our project will be monitored as part of the college-based academic research which will allow us to share our knowledge and data across other UK and international communities.

Waste Plastics TRIAL (1st in world)

Additionally, we have now established firm international relationships through our partners to use our AD system to trial waste PET plastics as a viable feedstock. This has never been tested before and the opportunity to do so, could be of significant benefit around the world. Our academic and international partners all inform us that the scientific evidence suggests it should work and such is the level of interest, it has led us to trial and monitor the results with our partners, GBTF, NAC , Hull and Liverpool Universities. This

has also led to our membership of the United Nations Association Great Lincolnshire project who are monitoring this very closely.

Technology Safety Conclusion

Our specialist HSE team has vast expertise in this sector and the information and research has helped us to know what not to do. The evidence and several workshops which included senior planning officers, councillors, academic groups and residents along with our AD specialist consultant identifies few reasons that this project, neither the relatively small AD technology nor its proposed use of trained volunteers, could not be achieved or safely managed

Financial Alternatives

As a result of identifying the need to expand the sites immediate and long-term power beyond that provided by the AD unit, in stage 2 we would like to address the longer-term energy needs and the implications of making the project financially sustainable. Having partnered with Community Energy England and had conversations with funders Power Change, we now need to develop a robust business plan in stage 2 around the additional installation of a cocktail of green energy technologies including large-scale wind turbines, solar voltaics and reserve battery backup as the 15-acre site aims to be 100% off grid within 5 years.

Planning & Permits - No significant issues were identified other than food being a feedstock would cause the project unsurmountable issues due to licencing, storage, and transport. Food therefore as a feedstock has been discounted and other good available feedstocks identified. We have researched information from the environmental agency regarding environmental impact and permits and again there is little concern that we would not be able to comply. In fact, the Environmental Agency is very keen to support small scale AD in the community.

Site Conclusion - Subject to receiving planning consent for the AD unit to be deployed on our 15-acre site there appears to be no issues with locating the AD unit in a safe designated area. Our planning team knows however, that we need to be very responsive to the concerns of residents. Covid 19 has caused the project some considerable delays this year notwithstanding our inability to have face to face meetings which we had planned. We are delighted however to have been able to connect with a much broader range of residents, businesses and VSCE organisations through the launch of our Facebook site. Launched only in September we were stunned by the amazingly supportive response to the project which now has over 1300 followers. We are conscious that we must continue a dialog as it is critical that we nurture their support and, in the future, we hope they may consider supporting the project further perhaps with a community share offer to incorporate wind and solar through renewable energy incentive schemes.

An anaerobic digestion resource such as that being proposed at Humberston has benefits far beyond those of energy production. The ability to offer an educational and demonstration resource to the local community, schools and colleges will be invaluable in promoting anaerobic digestion and renewable energy.

In addition, the collaboration with universities will also provide the potential for research and development at a scale which has been difficult to access.

Final Project Management end to end All dates and actions

AD-DV Ltd	david@ad.dv.com	07896 258786	4, 6, 8.
NAC-GBTF	cliff.spencer@gbtfoundation.org	07444 067321	6, 1, 10.
NAC-GBTF	andrew.ormerod@gbtfoundation.org	07908 978208	6, 2.
NAC-GBTF	admin@gbtfoundation.org	07973 393666	6, 3.
BPS-Project Planning	mark@bps-projectplanning.co.uk	07943 562682	9, 2.
Positive Activities	mark.fenty@positiveactivities.org	07730 014961	1, 2, 3, 5, 7, 8, 10
Positive Activities	elspeth.kasem@positiveactivities.org	07806 788245	FINANCE
Glyn Atkinson Safety Services	glyn@atkinsonssafetysservices.co.uk	07977 448540	8, 6, 3, 2

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4	AD Technology
5	Financial Projections
6	Planning, Permitting, legal
7	Site
8	Operation & Governance
9	Scheduling
10	Conclusions

All research findings and key documents for all key consultants with key defined and cross sector working are in shared folders for each of the following consultants.

[AD-DV Ltd](#)

[Glyn Atkinson](#)

[Mark Beckett](#)

[NAC – GBTF](#)

[Positive Activities](#)