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Rural Areas



Llywodraeth Cymru  
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## Building Capacity for Community-led Services through 21st Century Facilities

Reach  
July 2015

### Executive Summary

This study was set out with the primary purpose of developing options to support rural communities to gain the knowledge, skills and confidence to implement renewable energy solutions. This is in order to create sustainable longer-term solutions for the on-going management of community facilities and ensure that they are fit for purpose for 21<sup>st</sup> century community life.

Through this study a range of specific options have been developed which include an aspirational goal for a local community infrastructure network, a vision for a flagship renewable energy hub and a 'quick-win' interim action to pilot services within and for the rural community as summarised below.

#### 1) Bridgend College Renewable Energy Hub

The project proposal is to build and develop a renewable energy hub on the Pencoed campus, Bridgend College. It would have four primary functions including education, training, advice and demonstration. This would offer a medium to long term solution to addressing knowledge gaps in the community and inspire confidence in those managing community facilities, and others such as farm holdings, to adopt new solutions and create significant energy and cost-efficiencies.

The education function would focus on skills for industry enabling students to directly receive training in renewable technology installation and maintenance. The hub itself would be built using the latest technology and enhance learning through experiential learning, demonstrations, speakers and links with industry.

As a training centre, the hub would provide training for industry in renewable energy, enabling trades such as electricians or plumbers to benefit from additional vocational training in fitting and maintaining renewable energy systems in order to diversify their business.

As an advice centre, the hub would offer advice on the adoption of renewable energy technology within the community. It has the potential to demonstrate low carbon technology, make performance data available, de-risk projects for farmers, provide support for developing community schemes such as district heating networks and provide an inspirational facility. The hub would also act as the main point of contact for sharing current knowledge and information where other projects have been identified as examples of best practice and demonstrable case studies.

As a demonstration hub in of itself, the hub would demonstrate cutting edge technology as part of the building's own structure and fabric. Its energy needs would be met with renewable solutions along with other innovative technologies such as working examples of car chargers and photo-voltaic (PV) carports. There are also options to demonstrate solutions such as biomass, Combined Heat and Power (CHP), solar PV, heat pumps and wind.

## **2) Interim Pilot Project: Renewable Energy Advisory Service**

As the proposal for a Renewable Energy Hub is of such a scale that its development and delivery will take significant time to come to fruition, there is an opportunity to pilot an advisory service which could subsequently be delivered out of the hub, once constructed.

A service could offer audits of community facilities to identify the potential for adopting renewable solutions. Where these facilities have already had energy audits, there would be potential to look through those audits, explore which recommendations have been implemented and if they have not made any changes, to find out why, and offer support with their implementation. There is potential to work with a wide range of community venues, for example, rugby clubs, churches and schools and support these facilities to become more resilient, self-sustaining and able to offer improved and more cost-effective services to the communities in which they are located.

In turn, these actions will begin to address rural poverty and underpin a more sustainable economy, future proofing rural communities both economically and environmentally. A project delivered over a fixed period could work at the heart of the community, particularly those in rural areas, to raise awareness of renewables, encourage their uptake and map where there are gaps.

Such a project could also make the links with the renewables industry and identify the skills gaps, understand the potential for future training and create longer term jobs. There is also opportunity to create a partnership approach which would bring the renewable energy and energy efficiency sector together through a joined-up approach and support the development of the proposed renewable energy hub.

## **3) Ty Tanglwyst Hydrogen Fuel Cell Project**

Rural areas have plentiful opportunities for wind and solar PV installation but poor infrastructure in terms of energy grid that will support large scale generation. Converting excess energy to hydrogen fuel creates storage and transportation opportunities for renewable energy projects in these rural areas. The pilot project at Ty Tanglwyst Dairy Farm will demonstrate how a modular approach for a Hydrogen Fuel cell system could be

developed into a community energy project, leading the way of other projects in Wales and beyond.

Fuel cells and hydrogen technologies can release the full potential of renewable energy. A hydrogen energy system can transform rural communities by overcoming two of the major stumbling blocks of renewables: intermittency and grid connection. Hydrogen can be produced through the process of electrolysis by splitting water. Fuel cells use hydrogen to generate electricity and heat from safe electrochemical reactions with no combustion. The process is ultra-clean and dangerous toxic emissions are avoided.

Reach commissioned a hydrogen fuel study in the latter stages of the RDP 2007-2014. A key output of the study was the detailed design and costing of a hypothetical system based on a working dairy farm, Ty Tanglwyst, near Pyle in Bridgend County Borough. It also provides an economic assessment for developing a highly innovative rural hydrogen village (a type of local energy infrastructure network) based on this technology which includes:

- Solar PV or wind as the primary energy source
- Electrolyser to produce storable hydrogen from intermittent renewable electricity
- Hydrogen storage system
- Hydrogen pipeline supply
- Micro fuel cells which convert hydrogen into highly efficient and ultra-clean electricity and heat in buildings

## Recommendations

Based on the findings of this study, the key recommendations are as follows:

- R1. It is recommended that a pilot project is developed to offer independent energy advice for communities, produce evidence of advice and training needs, develop and trial a service delivery model. It is proposed that LEADER funding is sought for this pilot.
- R2. It is recommended that **reach** continues to work closely with Bridgend College and offers appropriate guidance in the development of the proposal for a renewable energy hub on the Pencoed campus. Where appropriate, **reach** can support the development of a network or partnership to underpin community and broader sectoral engagement in the proposal.
- R3. It is recommended that Bridgend College takes a leading role in the development of commercial aspects of the proposed renewable energy hub and works closely with **reach** on realising the wider community benefits of the proposals.
- R4. It is recommended that **reach** and the Local Action Group continue to explore opportunities to develop hydrogen fuel cell technology and the potential to address fuel poverty and local community energy infrastructure identifying whether funding is available, strategic partners are in place and the business case is cost-effective. In

addition, the Ty Tanglwyst site can become an innovative case study for students, industry and other farms to learn from if included within such a proposal.

- R5. It is recommended that connections are strengthened between the proposed renewable energy hub and the proposed hydrogen fuel cell project in order to cross-promote and share best practice as both are within the Bridgend County Borough area. Further links should be forged with Solcer House another example of a working demonstration site an energy positive house situated in the Tythegston area, and the first of its kind for the UK.

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## **1. Study Context**

The Rural Development Plan (RDP) for Wales is funded through the Common Agricultural Policy through the European Agricultural Fund for Rural Development. The programme for Wales is centrally administered by Welsh Government. The Local Action Group (LAG) for rural development in Bridgend County Borough (BCB) is responsible for the governance, delivery and monitoring of local rural development through the implementation of the rural Bridgend Local Development Strategy (LDS). The Bridgend LAG for rural development has instructed Bridgend County Borough Council as its Administrative Body to undertake detailed feasibility study to look at Building Capacity for Community-led Services through 21st Century Facilities in preparation for the launch of the rural Local Development Strategy and its Thriving Rural Communities scheme.

The importance of renewable energy and its uptake amongst the communities of Bridgend was explored through Rural Development Plan (RDP) for Rural Bridgend 2007- 2014 and has been identified as a priority area for the next Rural Development Programme in Bridgend. The Building Capacity for Community-led Services through 21st Century Facilities theme has explored the potential to harness renewable energies to drive forward services fit for the 21st Century, and the potential to help communities diversify in order to meet the needs of modern day residents.

The scope of this study is to identify proposals to increase future resilience within communities and community facilities, identify long-term sustainable solutions, enable energy self-sufficiency and reduce dependence on grant funding for future prosperity. It covers the rural wards of Bridgend as prescribed by the Rural Development Plan for Wales and seeks only to develop proposals for future project ideas and an approach to achieving a longer-term and aspirational goal.

## **2. Background**

The Rural Development Programme 2007- 2014 for Bridgend County Borough recognised the importance of renewable energy at a community level. A number of innovative initiatives, working closely with the community, were trialled and feasibility studies undertaken to build an evidence base for future activity.

This evidence has led to the inclusion of community renewable energy activities within the new rural Local Development Strategy for 2014-2020 under the LEADER theme *Renewable Energy at the Community Level* and subsequently the commissioning of this study to identify strategic projects which have the potential to benefit a wide cross-section of the rural community.

### **3. Review of Existing Evidence**

#### **3.1 Evidence from 2007-2014 programme**

The evidence base developed through the RDP 2007-2014 programme includes the following set of studies and their key outcomes:

##### **Renewable Energy Feasibility Study for Bridgend College, Pencoed Campus (2014)**

This was a comprehensive study to look at the opportunities for generating renewable energy on the site of the Pencoed Campus of Bridgend College. It reviews current energy usage and costs and the appropriateness of structures and infrastructure for the adoption of more sustainable solutions to meeting energy needs. The concept of a renewable energy and sustainability hub is discussed which could assist the college in developing a support service for the community. Given that the college does not operate as a working farm then the best way to support the objectives of implementing the next phase of renewable technologies (anaerobic digestion, hydro-power, hydrogen fuel cells, electric vehicles, biomethane powered vehicles and energy storage) could be through an advice centre. This could include independent advice and performance data on demonstration farms. Demonstration of specific technologies and low carbon building design could be included in the hub design where not installed elsewhere on the site.

The study outlines that “the Low Carbon Research Institute (LCRI) was set up to unite and promote energy research in Wales. This has resulted in the Welsh Energy Sector Training (WEST) and Built Energy Sustainability Training (BEST) to support the delivery of low carbon expertise. The WEST training is being led by universities in Wales, each specialising in specific technologies to develop a centre of excellence for research and university training”.

The feasibility study states that “opportunities exist for Pencoed to develop the Renewable Hub and construction courses around the Low Carbon Built Environment objectives of delivering education to fill the training gaps identified by the Welsh Energy Sector Training (WEST) study. Further Education Colleges are being sought to supply this training alongside the academic centres of excellence for specific renewable technologies.

##### **Evanstown Community Hydrogen Scheme Feasibility Study (2013)**

This community-led project looked at the feasibility of a community hydro project in Evanstown, centred around the Evanstown Community Hall, but with the aim of bringing much wider community benefit. The project highlighted a number of potential pitfalls concentrated mainly around planning permission and land ownership, however, as a principle it demonstrated a positive outcome. The project has since been progressed independently by the community.

##### **Future Farm Energy Consultation (2014)**

In conjunction with Farming Connect, the Future Farm Energy project delivered wide consultation with farmers culminating in a Future Farm Energy event in Lakeside Farm Park which attracted farmers from within and outside of the county borough. The aim of the consultation was to gauge farmer’s experiences with renewable energy. This was in order to understand their perceptions of renewable energy technology and the barriers and challenges they face in increasing take-up of these technologies within the farm setting.

The Future Farm Energy consultation laid the foundations for two further pieces of work:



### **Farm Energy Guide (2014)**

The first of these was a guide on renewable energy targeted specifically at farmers. A booklet was produced through the LEADER programme which illustrated case studies of renewable energy technologies being used on-farm. A useful addition to the guide was feedback from the project lead on each example outlining the pros and cons of each system.

### **Innovative Pilot Study to Design a Rural Energy System (2014)**

Secondly, one of the farms engaged in the Future Farm Energy consultation agreed to take part in a feasibility study for the installation of a hypothetical hydrogen energy project on their farm - both on its own, and as part of a rural energy village (local infrastructure network). The study provides a detailed design for a self-contained hydrogen energy system for Ty Tanglwyst, a dairy farm near Pyle. As this hydrogen technology is modular, the study is able to provide an economic assessment for developing it as a highly innovative rural hydrogen village.

### **Renewable Energy advice consultation with farmers 2015**

Further consultation was undertaken with farmers at a Farming Connect renewable energy event through a questionnaire which was designed to establish if there is a need for help and guidance on the installation of renewable energy on farms in Bridgend and surrounding area.

The majority of farmers questioned said that they were currently able to get independent advice on renewable energy, mainly from sources such as the Farmers Union of Wales and Farming Connect.

The farmers questioned also said they would benefit from a local centre for energy advice and demonstrations of technologies. The technologies they would like to see demonstrated were:

- Solar Thermal
- Hydro
- Solar Photovoltaic
- Wind
- Bioenergy

Please see appendix for copies of questionnaires.

## **3.2 Recent Developments**

### **Study Visits (2015)**

Reach officers along with representatives from Bridgend College met with the Dairy Development Centre based at Coleg Sir Gar in Carmarthenshire and the Gower College Renewable Energy Centre in Swansea, which are an advice hub and training hub respectively. The purpose of the visits was to identify opportunities to learn from these case studies, discuss outline proposals and explore further opportunities for working collaboratively. It was found that the proposed hub complements the work of Coleg Sir Gar without duplicating it. The Dairy Development Centre has a distinct focus on supporting the

dairy industry and improving efficiencies. Similarly, although the proposed hub will offer similar training to the Centre in Swansea, its focus is on providing training to local people and filling local skills gaps. Similar skills training in Bridgend County Borough is expected to have little impact on this activity and is unlikely to displace the service.

### **Launch of Solcer House (July 2015)**

This working demonstration project was delivered in a partnership led by the Low Carbon Research Institute (LCRI). Located near the village of Tythegston in rural Bridgend County Borough, the house is the first ever energy positive demonstration home built in the UK and offers visible and tangible demonstration of cutting edge technology within the domestic setting. The building is not used as a dwelling, however, it is a fully fitted and functioning replica of a domestic home. There are clear links between this project and the proposal to build a demonstration site at Bridgend College in Pencoed with opportunities for learning best practice, addressing lessons learnt and establishing working relationships with the partners on the project.

### **Energy Technologies Institute (live project bid)**

Bridgend County Borough is one of three authorities in the last stages of securing funding for large carbon reduction projects from the Energy Technologies Institute (ETI), a public-private partnership between global energy and engineering companies and the UK Government. Bridgend has proposed two large district heat projects that will involve a central heating source distributed to many individual properties. If successful this multi-million pound project will retrofit a significant number of properties over several years.

### **Bridgend County Borough Rural Local Development Strategy (live submission)**

The Local Development Strategy for Bridgend County Borough was developed throughout 2014 and submitted to Welsh Government for approval. Once approved, the Strategy will release rural development funding under the LEADER measure to deliver the vision of creating '*Self-sustaining, diverse and vibrant rural communities*'. There are three strategic priorities within the document: '*A place to live: creating self-sustaining rural communities*', '*A place to visit: developing diversified rural enterprises*' and '*A place to work: supporting vibrant rural economies*'.

### **Discussion with Groundwork Wales**

Discussion with Groundwork Wales and Caerphilly RDP team during 2015 highlighted a particular piece of work that has been undertaken in Caerphilly with support of the RDP 2007-2014. The projects were:

#### *The Rural Green Doctor (Caerphilly)*

This project provided energy and carbon reduction advice to Caerphilly's rural communities and helped to address fuel poverty risk in those areas. One aim of the project was that community venues benefit from energy saving measures and become more resilient to fuel price rises in the future.

#### *Sustainable Energy for Farm Households (Caerphilly)*

This innovative project had two dedicated Sustainable Energy Officers who engaged with farm households and rural businesses to reduce energy use and promote the uptake of renewable energy in particular the opportunities for biomass, solar, wind and micro hydro technology. Through promoting sustainable energy solutions the aim was to increase the profitability of farms and rural businesses and to reduce their impact on the environment.

As part of the project an exemplar off grid farm house was built. The main aim of the project was to provide a renewable energy generation and water resource solution in an off grid setting. This involved major challenges including balancing the various technologies and ensuring compliance with all appropriate regulations including Planning, Building Regulations and the Code for Sustainable Homes Level 3.

Caerphilly County Borough Councils RDP Sustainable Energy team worked in partnership with BRE, SSE and the farm owners to provide a solution that balanced resource efficiency with renewable technologies. BRE provided the building design work and initial technical feasibility of the renewable energy technologies while SSE provided the funding, design and installation services of these technologies.

### **3.3 Conclusions**

From reviewing this evidence base and the consultation activities undertaken as a part of their development, a number of key conclusions can be drawn.

#### **A Lack of Impartiality**

Through these projects, it can be recognised that the renewable energy sector is sometimes viewed with mistrust as impartial advice is not consistently available. Many communities have been unable to access information on the range of potential alternatives, and the comparative costs and benefits of low carbon alternatives, from an independent source. It can also be beneficial for communities to see demonstrations and case studies and especially to speak to their peers who have already undertaken renewable energy projects to better understand the options available to them.

#### **Training Gaps**

The Bridgend College, Pencoed Feasibly Study highlighted the gaps in training in the renewable sector that were identified by BEST (Built Environment Sector Training) and WEST (Welsh Energy Sector Training).

#### **Fuel Poverty**

Community renewable energy projects can help to address fuel poverty in several ways. They can, for example, underpin advice and guidance provided at a senior level to community officials and leaders, providing working case studies and testing and demonstrating new technology. This supports informed policy choices to move towards a lower carbon economy, resilient to climate change and the challenges of the transition beyond peak oil. Support and strategic direction towards adopting new technologies within the community can significantly contribute to reducing the energy costs within communities and begin to address fuel poverty.

In addition, renewable energy projects developed for the Energy Technologies Institute (ETI) would aim to assist Bridgend County Borough's district heat plans which are primarily designed to reduce carbon and directly protect residents of Bridgend Town and Maesteg from moving into fuel poverty. Training local people in the skills needed to install renewable technologies should reduce costs of installation and make these technologies more accessible to the community. In turn this will reduce household bills and enable residents to realise an income from feed in tariffs (FITS) and further address fuel poverty.

### **Green Infrastructure**

The Local Development Strategy for Rural Bridgend has recognised that there are many opportunities available to develop renewable energy schemes. The natural resource available within Bridgend can bring a major added value in the form of a green infrastructure underpinning sustainable development and a vibrant rural economy. LEADER in Bridgend will aim to support the development of a green economy for rural Bridgend and the development of renewable energy opportunities to benefit rural communities.

### **Piloting**

Many of the types of projects that are emerging from this analysis will require significant investment in their development and delivery and a significant amount of time and resource to realise, which is further evidenced from existing facilities of this nature. However, from the evidence a number of opportunities exist to begin piloting solutions on the ground in the short term, using services that go out to the community, for example, based on Groundwork's Green Doctors model. As renewable energy at the community level is included as a key theme and a local priority within the Local Development Strategy, there is an opportunity to seek LEADER funding from the RDP in order to pilot such activities, should the Local Development Strategy for rural Bridgend be approved for funding.

## **3.4 Next Steps**

Based on this review, the following three projects are proposed with the feasibility of their implementation detailed in full at sections 4-6.

### **3.4.1 Bridgend College Renewable Energy Hub**

This proposal is to build and develop a renewable energy hub on the grounds of the Pencoed campus, Bridgend College. It would have four primary functions including education, training, advice and demonstration. This would offer a medium to long term solution to addressing knowledge gaps in the community and inspire confidence in those managing community facilities, and others such as farm holdings, to adopt new solutions and create significant energy and cost-efficiencies.

The education function would focus on skills for industry enabling students to directly receive training in renewable technology installation and maintenance. The hub itself would be built using the latest technology and enhance learning through experiential learning, demonstrations, speakers and links with industry.

As a training centre, the hub would provide training for industry in renewable energy, enabling trades such as electricians or plumbers to benefit from additional vocational training in fitting and maintaining renewable energy systems in order to diversify their business.

As an advice centre, the hub would offer advice on the adoption of renewable energy technology within the community. It has the potential to demonstrate low carbon technology, make performance data available, de-risk projects for farmers, provide support for developing community schemes such as district heating networks and provide an inspirational facility. The hub would also act as the main point of contact for sharing current knowledge and information where other projects have been identified as examples of best practice and demonstrable case studies.

As a demonstration hub in of itself, the hub would demonstrate cutting edge technology as part of the building's own structure and fabric. Its energy needs would be met with renewable solutions along with other innovative technologies such as working examples of car chargers and photo-voltaic (PV) carports. There are also options to demonstrate solutions such as biomass, Combined Heat and Power (CHP), solar PV, heat pumps and wind.

### **3.4.2 Interim Pilot Project: Renewable Energy Advisory Service**

As the proposal for a Renewable Energy Hub is of such a scale that its development and delivery will take significant time to come to fruition, there is an opportunity to pilot an advisory service which could subsequently be delivered out of the hub, once constructed.

A service could offer audits of community facilities to identify the potential for adopting renewable solutions. Where these facilities have already had energy audits, there would be potential to look through those audits, explore which recommendations have been implemented and if they have not made any changes, to find out why, and offer support with their implementation. There is potential to work with a wide range of community venues, for example, rugby clubs, churches and schools and support these facilities to become more resilient, self-sustaining and able to offer improved and more cost-effective services to the communities in which they are located.

In turn, these actions will begin to address rural poverty and underpin a more sustainable economy, future proofing rural communities both economically and environmentally. A project delivered over a fixed period could work at the heart of the community, particularly those in rural areas, to raise awareness of renewables, encourage their uptake and map where there are gaps.

Such a project could also make the links with the renewables industry and identify the skills gaps, understand the potential for future training and create longer term jobs. There is also opportunity to create a partnership approach which would bring the renewable energy and energy efficiency sector together through a joined-up approach and support the development of the proposed renewable energy hub.

### **3.4.3 Ty Tanglwyst Hydrogen Fuel Cell Project**

Rural areas have plentiful opportunities for wind and solar PV installation but poor infrastructure in terms of energy grid that will support large scale generation. Converting excess energy to hydrogen fuel creates storage and transportation opportunities for

renewable energy projects in these rural areas. The pilot project at Ty Tanglwyst Dairy Farm will demonstrate how a modular approach to a hydrogen fuel cell system could be developed into a community energy project, leading the way of other projects in Wales and beyond.

Fuel cells and hydrogen technologies can release the full potential of renewable energy. A hydrogen energy system can transform rural communities by overcoming two of the major stumbling blocks of renewables: intermittency and grid connection. Hydrogen can be produced through the process of electrolysis by splitting water. Fuel cells use hydrogen to generate electricity and heat from safe electrochemical reactions with no combustion. The process is ultra-clean and dangerous toxic emissions are avoided.

Reach commissioned a hydrogen fuel study in the latter stages of the RDP 2007-2014. A key output of the study was the detailed design and costing of a hypothetical system based on a working dairy farm, Ty Tanglwyst, near Pyle in Bridgend County Borough. It also provides an economic assessment for developing a highly innovative rural hydrogen village (a type of local energy infrastructure network) based on this technology which includes:

- Solar PV or wind as the primary energy source
- Electrolyser to produce storable hydrogen from intermittent renewable electricity
- Hydrogen storage system
- Hydrogen pipeline supply
- Micro fuel cells which convert hydrogen into highly efficient and ultra-clean electricity and heat in buildings

#### **4. Proposal 1: Renewable Energy Hub at Bridgend College, Pencoed Campus.**

##### **4.1 Background**

This proposal was identified within the *Feasibility Study for Renewable Energy at Bridgend College, Pencoed Campus (2014)*. It was identified as a potential resource to showcase the latest in renewable technology with a focus on solar photovoltaics that would be used to demonstrate the technology to students as part of their courses.

Further meetings with the Senior Management Team at Bridgend College, and Chris Long the Sustainability Officer, led to the identification of further options for the hub including developing it as a social enterprise and creating a community space that could be used by the community in the evening and at weekends.

##### **4.7 Project Description**

This proposal is to build and develop a renewable energy hub that would have four functions:

- Education,
- Training,
- Independent advice, and
- Demonstration of renewable technologies.

The education function would enable students to undertake renewable energy training as part of courses which provide skills for industry. The hub would be built using the latest

renewable technologies with which students could engage as part of their college course. The promise and performance: The Report of the Independent Review of the Mission and Purpose of Further Education in Wales in the context of the Learning Country: Vision into Action (Webb Review 2007)<sup>1</sup> stressed the importance of embedding sustainable development into the curriculum through the implementation of 'education for sustainable development and global citizenship' (ESDGC). The facility would offer support in the delivery of ESDGC to visiting educational entities from primary through to higher education across south and mid-Wales. The hub would enhance the experience of students through experiential learning, demonstrations, speakers and links with industry.

The second function of the hub would be as a training centre which would provide renewable energy training for industry. This would enable training for trades, such as electricians and plumbers, in fitting and maintaining renewable energy systems in order to diversify their business. Bridgend County Borough is one of three authorities in the last stages of securing funding for large carbon reduction projects from the Energy Technologies Institute (ETI), a public-private partnership between global energy and engineering companies and the UK Government. Bridgend has proposed two large district heat projects that will involve a central heating source distributed to many individual properties. If successful this multi-million pound project will retrofit a significant number of properties over several years. The hub will address two potential problems: a lack of vocational opportunities for young people in Bridgend County Borough and, if successful, a shortage of skilled workers to implement the ETI district heat project.

The third function of the hub would be to deliver independent advice to promote adoption of renewables technologies amongst the communities of Bridgend County. The hub would present an independent way of demonstrating low carbon technologies, making performance data available, de-risking projects for farmers, providing support for developing community schemes such as district heating and providing an inspirational facility to promote these activities. The hub could also act as a central point of contact for sharing knowledge and highlighting best practice where other renewable energy projects have been developed, for example on other farms or in the community. It is envisaged that sector-leading farmers could potentially tie in with this project.

The fourth function of the hub would be to demonstrate cutting edge technologies as part of the building's structure and fabric along with opportunities to showcase other innovative technologies such as car chargers and photo-voltaic (PV) carports. There are also options to demonstrate biomass, Combined Heat and Power (CHP), solar PV, heat pumps and wind.

The renewable energy hub would be a significant asset for communities in the local area and wider, ideally situated in central south Wales with excellent transport links to east and west Wales via the M4 corridor and good links to the surrounding valleys and mid-Wales.

In the longer term it is envisaged that the project would be a catalyst for private low carbon businesses to locate into the area supporting the Welsh Government's Green Jobs Strategy and Bioenergy Action Plan for Wales, which aims to generate 5 TWh per year of electricity, 20% of the country's current need from renewable biomass by 2020.

### **4.3 Need for the Project**

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[http://gov.wales/dcells/publications/policy\\_strategy\\_and\\_planning/furtherandhighereducation/fehereviews/webbreview/promiseperformance-e.pdf?lang=en](http://gov.wales/dcells/publications/policy_strategy_and_planning/furtherandhighereducation/fehereviews/webbreview/promiseperformance-e.pdf?lang=en)

**reach** and Farming Connect established a need for independent energy advice for farmers and rural businesses through consultation for the *Future Farm Energy* study. The study suggested that renewable energy information and knowledge transfer in South Wales was sporadic and highlighted a lack of impartial advice available to rural communities and farmers seeking to reduce reliance on carbon-based forms of energy. The research also highlighted gaps in training in the renewables sector that were identified by BEST (Built Environment Sector Training) and WEST (Welsh Energy Sector Training).

This hub could act as a centre for providing this advice not only to rural businesses but also to the community helping residents threatened by fuel poverty and helping to strengthen community facilities, improving their longer-term resilience.

BCBC is applying to the Energy Technologies Institute (ETI) for a large district heating project in Bridgend and potentially also Maesteg. This would involve retro-fitting hundreds of houses and would create considerable employment opportunities. Skills in renewable energy installation would be needed and people with traditional skills like plumbing and plastering will also be in demand. The energy hub with its positioning within the College is in a strong position to match skills training of young people and job seekers with the skills needed to fill the skills gaps created by the potential district heating scheme.

## 4.2 Stakeholders

### 4.1.1 Actual Stakeholders

This section identifies the current stakeholders in this project including why they are a stakeholder, how they are affected by the project, and their anticipated influence required over the critical success factors.

Stakeholder	Interest: <i>High/Med/Low</i>	Influence/Rationale: <i>High/Med/Low</i>
<b>Reach Rural Development Team</b>	<b>High</b> Leading on the research and development of this study and much research which has been undertaken through the last RDP 2007-2014 on renewable energy.	High Lead on this study.
<b>Bridgend College</b>	High Bridgend College are leading in the development and build of the proposed energy hub on their campus.	High Lead on the development of the hub project. The college have been engaged through the whole study process and have written the energy hub idea into their estates strategy.
<b>BCBC Sustainability Team</b>	High	Medium



	<p>BCBC Sustainability Team ensures that council buildings and facilities are as sustainable as possible in construction and environment management systems are maintained. They lead on council run renewable energy projects in the borough, and enable residents to access Welsh Government &amp; UK Government energy saving schemes, such as the current discount boiler scheme.</p>	<p>BCBC Sustainable Team have been engaged in all project development and have been advised where links can be made and value added to existing work and also identify gaps.</p> <p>Links have been made between BCBC Sustainability and reach's projects on Future Farm Energy, Hydrogen Fuel Cells and Bridgend Energy Hub. Reach have also contributed as a stakeholder into the ETI District Heat project being developed by BCBC Sustainability.</p>
<p><b>South East Wales Community Economic Development Programme (SEWCED)</b></p>	<p>Medium.</p> <p>SEWCED have supported community and voluntary groups (third sector) to generate their own income providing key products, services, vital employment and invaluable volunteering opportunities at the heart of their communities.</p> <p>The SEWCED team based within BCBC have been involved in advising Bridgend College about the best way to set up the hub in order to potentially access funding or run as an independent business.</p>	<p>Medium</p> <p>SEWCED have attended a number of meetings with regard to the hub development.</p>
<p><b>Farming Connect</b></p>	<p>Medium</p> <p>Farming Connect provides farm and forestry businesses with advice, guidance, training and events.</p>	<p>Medium</p> <p>Any engagement with the farming community on renewable energy have been undertaken jointly with farming connect.</p> <p>Farming Connect are engaged with on work relating to the farming community to understand where we can add value and support each other's work but at the same time avoiding duplication.</p>
<p><b>Groundwork Wales</b></p>	<p>Medium</p> <p>Groundwork Wales are an environmental regeneration charity.</p> <p>Groundwork Wales have delivered an energy efficiency project called Green Doctors delivered through</p>	<p>Medium</p> <p>Groundwork Wales have shared best practice on the renewable energy and energy efficiency projects they developed from the last programme and have discussed the potential of delivering similar projects in</p>

	<p>the Caerphilly RDP. Caerphilly RDP have also delivered a project called Sustainable Energy for Farming Households.</p> <p>Groundwork Wales also sit on the Bridgend Local Action and will be involved in the decision making process for project proposal send to the LAG for approval.</p>	Bridgend County Borough.
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#### 4.2.2 Potential Stakeholders

<b>Stakeholder</b>	<b>Interest: <i>High/Med/Low</i></b>	<b>Influence/Rationale: <i>High/Med/Low</i></b>
<b>Industry, Energy Companies/Utility providers</b>	<p>Medium</p> <p>The colleges construction department already has good links with industry.</p> <p>For the renewable energy hub project it will be important to have links with industry to understand the needs the industry require with regards to skills gaps and also to ensure that the latest technologies are demonstrated. Industry sponsorship is also something that could be considered as part of the project.</p>	<p>Low</p> <p>No engagement as of yet.</p>
<b>Gower College Swansea</b>	<p>Medium</p> <p>Gower College Swansea have already set up an Energy Centre. The GCS Energy Centre is a one-stop shop for all building services training needs. Whether it is individuals starting a career or looking to update individual or employees' skills, a wide range of industry-recognised courses at a fully equipped centre are offered.</p>	<p>Medium</p> <p>This does complete with the Bridgend Energy Hub, but operates in a different geographical area. Not offering local training to local people to fill local skills gaps.</p>
<b>Welsh Government</b>	<p>Low</p> <p>The project has been driven by need recognised locally in Bridgend (addressing fuel poverty) and regionally with Farming Direct rather than having influence</p>	<p>Medium</p> <p>The advice offered by the hub needs to align with Welsh Government policy on encouraging renewable energy and moving towards a low</p>

	nationally from Welsh Government.	carbon economy.
<b>Wales and West Utilities (WWU)</b>	Low  The energy hub maybe a mechanism to showcase the hydrogen fuel cell project being developed with WWU at Ty Tanglwyst.	Low  WWU project will lead the partnership as an applied example of hydrogen fuel cell technology.
<b>The Dairy Development Centre at College Sir Gar</b>	Medium  The Dairy Development Centre at College Sir Gar have delivered energy efficiency projects within the dairy industry which trialled and tested through the last RDP for Wales 07-14.  The proposed hub will not duplicate any work the dairy development centre	Medium  The energy hub will work with the Coleg Sir Gar Centre, referring people between the centres to make to most use of their differing areas of expertise.
<b>The Carbon Trust</b>	Low  The Carbon Trust aims to support projects that cut carbon emissions and costs.	Low  This project aims to fill an advice need not being addressed by the Carbon trust.
<b>Building Research Establishment (BRE)</b>	Medium  BRE would like buildings to be as sustainable as possible reaching their BREEAM Excellence standard of construction.	Medium  To really be an exemplar of energy reduction the building should be built to BREEAM Excellence.
<b>Communities First.</b>	Medium  Communities First will be engaged with issues relating to fuel poverty in Communities First areas of Bridgend. This will ensure any work will done will add value to their programme and avoid any duplication.	Medium  One meeting has been held with C1st to make them aware of the study.
<b>The Environmental Association of Universities and Colleges (EAUC)</b>	Low  EAUC are always interested in case studies that demonstrate higher and further education institutions being more sustainable.	Low  EUAC would only be interested in hearing how the project progressed as information for its members rather than getting involved in the projects development.

## **4.4 Funding**

Further consultation with lecturers in plumbing in the College identified that there is a need for short courses to train existing tradesmen in new technologies and techniques. The energy hub would provide an ideal venue for hosting these training days and this activity could generate new revenue for the College.

The work that Farming Connect has undertaken with farmers suggests that they would be willing to pay a fee of around £200 for good quality independent advice on installing renewable energy on their farms. The hub project could provide this consultancy and create another sustainable revenue stream.

In terms of community funding for the project, the only funder large enough to fund a project of this scale would be Big Lottery. This has been investigated and it was found that Big Lottery would not accept a partnership of organisations applying to the fund, and the College would not be keen to lease its land or give ownership of the building to another organisation. This means that there is unlikely to be a large community fund the college could apply for to fund the total build.

The potential for sponsorship to pay for the building needs further investigation, as well as working with industry partners to donate equipment to be used educationally in this exemplar building, however this will potentially come with a hefty compromise in terms of being able to guarantee impartial advice.

To adapt to the future funding structure of further education, Bridgend College will need to rationalise its estate across both of its campuses. This project is being considered within plans for developing its estate and further opportunities could arise within those plans. Section 106 funding could be an example of such an opportunity.

In order to progress the project further, two further pieces of work have been identified in the context of funding the hub:

- Detailed designs and costings for the construction of the hub and implementation of the project.
- A full cost analysis to identify sustainable income streams and analyse income generating potential versus the expected outgoings once operational.

## **4.6 Project Scope**

It is envisaged that the first phase of the project potentially trialled by LEADER will continue to establish an evidence base for the energy hub development and will aim to develop a joint approach the renewable energy and energy efficiency at a local level, and further establish and support communities with renewable energy installation advice and energy efficiency guidance.

The second phase of the project, the creation of the energy hub will aim to be an exemplar project, attracting students, businesses and communities from within and out the county to

the college. The hub will also aim to be leader in energy advice for businesses and communities. The project will aim to have an impact locally by offering support for communities, aiming to reduce fuel poverty. By the hub potentially being an exemplar project and a leader in its field, it will potentially attract business to the area.

With technologies developing so fast it will be important to have industry involvement in order to stay a leader in the field. It will be important that the hub can be sustainable and other elements of the hub will be considered such as an eco-café to generate extra income and engage the public with the project.

#### **4.8 Outputs**

The following outputs are expected from this project:

- 20 Students per year gaining skills in renewable energy technologies
- 2 Jobs created to run the hub
- 100 Businesses per year participating in renewable energy training
- 5 Students gaining employment in a renewable energy sector industry
- 100 businesses advised on renewable energy options per year
- 1000 Individuals advised on renewable energy options for their home per year

#### **4.9 Outcomes**

In addition to these outputs a range of longer-term outcomes are anticipated from this project. Essentially these are the main economic drivers behind this proposal:

- Greater uptake of renewable energy projects amongst the farming and local communities of Bridgend.
- Leading innovative community energy project within the Bridgend county borough
- Leading innovative farm energy projects
- Reduced energy costs for businesses and communities
- Reduction in fuel poverty
- Students with a new skill set in producing energy efficient buildings
- Training courses / apprenticeships offered in the sector
- Private investment in energy projects
- Increase in out-of-county student admissions attributed to the hub
- Attracting visitors to the centre and usage of the community room
- Attracting renewable energy start-ups and SMEs to the area.

#### **4.10 Links to other Programmes, Projects and Investments**

This project will aim to support the Welsh Government's pledge to make Wales a Low Carbon Economy – to maximise energy and environmental investment and bring economic benefits to business and communities. It will also support Communities First anti-poverty agenda.

This project will support UK energy policy as set out in the Energy White Paper of May 2007 and Low Carbon Transition Plan of July 2009. The current focus of policy is on reforming the Electricity Market, rolling out smart meters and improving the energy efficiency of the UK building stock through the Green Deal.

This project will support the Welsh Government's Green Jobs Strategy and Bioenergy Action Plan for Wales, which aims to generate 5 TWh per year of electricity, 20% of the country's current need from renewable biomass by 2020.

*"Wales once led the world in carbon-based energy. Our goal now is to do the same for low carbon energy"* (Welsh Government Cabinet 2010).

BCBC has adopted a Green Infrastructure approach to develop in its Local Development Plan (LDP). This ensures that the green (natural) infrastructure such as biodiversity and flood risk are considered equally with grey (built) infrastructure such as roads and sewerage within the planning process. The hub will also support sustainable development through the adoption and encouragement of a green infrastructure approach to development and the exploration of renewable energy solutions to meeting local needs. In turn these actions will begin to address rural poverty and contribute to a more sustainable economy, future proofing rural communities both economically and environmentally.

The building will aim to achieve BREEAM excellence working with BRE in the design stages and through construction.

#### **4.11 Viability**

Risks:

- There is currently a strong drive from the College for the project to be developed, however, there is a risk if key staff move on from their current roles that this may delay the project's development. Robust business plans will be needed to ensure a valid business case for the project going forward which would enable new staff to understand the value and viability of the project. The project forms a part of the College's estate strategy which further supports its development.
- The project will require a significant investment of funding or finance in order to realise it. Robust business plans will be needed to ensure a valid business case for the project going forward in order to secure sufficient backing and investment. Business plans will need to ensure a financially viable future for the project including contingency planning and a range of options for realising a sustainable income for the hub. There will be a contingency plan to deliver the training and advice from another building at the College or delivered by another organisation if the hub is delayed or postponed for a significant period.
- There is a risk that the technologies to be used within the fabric and structure of the building and for demonstration purposes will become outdated during the time of build, particularly if there are significant delays. This could have implications in regards to planning applications having to be resubmitted if significant changes are required. This risk is hoped to be mitigated by involving industry and partners on the

cutting edge of technological advancement involved in the planning and development of the hub in order to look ahead to new developments. There is potential that newer technologies could be added as demonstration exhibits within the building, with the building built to the best standard at the time.

- There is a risk that the advice and training needs identified will not be met without this project going ahead, or if there is a significant time lapse between now and the project coming to fruition. There is an opportunity for a LEADER study to pilot the ideas and trial them before developing and constructing the full energy hub.
- There is a risk that the project could become over-focused on becoming a commercially viable entity in order to secure backing to the detriment of the community support potential of the hub. This can be mitigated with support from organisations such as reach and Farming Connect throughout the planning stages.

#### Benefits:

There is a strong partnership between reach, BCBC Officers, Farming Connect and Bridgend College working together to develop the project. The need for energy advice and training in new skills in renewable energy installation has been well established. The project will aim to provide training locally for young people and jobseekers to fill the skills gaps that have been identified locally. Further business planning will establish if the hub is the most viable way to deliver the above.

### 4.12 Recommendations

- R1. It is recommended that **reach** continues to work closely with Bridgend College and offers appropriate guidance in the development of the proposal for a renewable energy hub on the Pencoed campus. Where appropriate, **reach** can support the development of a network or partnership to underpin community and broader sectoral engagement in the proposal.
- R2. It is recommended that Bridgend College takes a leading role in the development of commercial aspects of the proposed renewable energy hub and works closely with **reach** on realising the wider community benefits of the proposals.

## 5. Interim Pilot Project: Renewable Energy Advisory Service

### 5.1 Background

As the Renewable Hub is a large project and will take some time to develop, in the meantime there is opportunity to start work through the Rural Development Programme in Bridgend to undertake a pilot study to develop an advice service to eventually be based at the hub.

LEADER project activities as identified in the Local Development Strategy for rural Bridgend will aim to support sustainable development through the adoption, encouragement and

exploration of renewable energy solutions to meeting local needs. In turn these actions will begin to address rural poverty and a more sustainable economy, future proofing rural communities both economically and environmentally.

Previous research as mentioned earlier in the document has established that there is a need to address knowledge gaps in the community and inspire confidence in those managing community facilities, and others such as farm holdings, to adopt new solutions and create significant energy and cost–efficiencies.

## **5.2. Project Description**

The project will focus on three main areas:

- **Awareness raising of renewable technologies.**  
The project will raise awareness of the renewables technologies, encourage its uptake and map where there are gaps and produce evidence of advice and training needs, develop and trial a service delivery model. The evidence will be used to further grow the service delivery of the hub and identify further projects. The project could also make the links with the renewables industry and identify the skills gaps, understand the potential for future training and create longer term jobs.
- **Energy efficiency audits.**  
A service could offer audits of community facilities to identify the potential for adopting renewable solutions. Where these facilities have already had energy audits, there would be potential to look through those audits, explore which recommendations have been implemented and if they have not made any changes, to find out why, and offer support with their implementation. There is potential to work with a wide range of community venues, for example, rugby clubs, churches and schools and support these facilities to become more resilient, self-sustaining and able to offer improved and more cost-effective services to the communities in which they are located.
- **Renewable Energy Network**  
There are many key players involved with renewable energy and energy efficiency. There is a need for work to be undertaken to deliver a joint approach to renewable technologies and energy efficiency in the county borough of Bridgend by creating a network of all key players. Research will need to be undertaken to understand who all the key players are in the renewable energy sector and understand who carries out what areas of work and where value can be added.

In turn, these actions will begin to address rural poverty and underpin a more sustainable economy, future proofing rural communities both economically and environmentally. A project delivered over a fixed period could work at the heart of the community, particularly those in rural areas, to raise awareness of renewables, encourage their uptake and map where there are gaps.



### 5.3 Need for Project

reach and Farming Connect established a need for independent energy advice for farmers and rural businesses through consultation for the Future Farm Energy study. The study suggested that renewable energy information and knowledge transfer in South Wales was sporadic and highlighted a lack of impartial advice available to rural communities and farmers seeking to reduce reliance on carbon-based forms of energy. The research also highlighted gaps in training in the renewables sector that were identified by BEST (Built Environment Sector Training) and WEST (Welsh Energy Sector Training).

This trial project could provide advice not only to rural businesses but also to the community helping residents threatened by fuel poverty and helping to strengthen community facilities, improving their longer-term resilience. The trial could also continue to build an evidence base and build a partnership approach to renewable energy and energy efficiency in Bridgend.

BCBC is applying to the Energy Technologies Institute (ETI) for a large district heating project in Bridgend and potentially also Maesteg. This would involve retro-fitting hundreds of houses and would create considerable employment opportunities. Skills in renewable energy installation would be needed and people with traditional skills like plumbing and plastering will also be in demand. This project could continue to research the need for the skills gaps and build relationships with industry.

### 5.4 Stakeholders

#### 5.1.1 Actual Stakeholders

This section identifies the key stakeholders outlining why they are a stakeholder, how they are affected by the project and the degree of their influence that is required over critical success factors.

Stakeholder	Interest: <i>High/Med/Low</i>	Influence/Rationale: <i>High/Med/Low</i>
<b>Reach Rural Development Team</b>	<b>High</b>  Leading on the research and development of this study and much research has been undertaken through the last RDP 2007-2014 on renewable energy.	<b>High</b>  Lead on this study and potential source of funding for a trial.
<b>BCBC Sustainability Team</b>	<b>High</b>  BCBC Sustainability Team ensures that council buildings and facilities are as sustainable as possible in construction and environment management systems	<b>Medium</b>  BCBC Sustainable Team have been engaged in all project development and have been advised where links can be made and value added to

	<p>are maintained. They lead on council run renewable energy projects in the borough, and enable residents to access Welsh Government &amp; UK Government energy saving schemes, such as the current discount boiler scheme.</p>	<p>existing work and also identify gaps.</p> <p>Links have been made between BCBC Sustainability and reach's projects on Future Farm Energy, Hydrogen Fuel Cells and Bridgend Energy Hub. Reach have also contributed as a stakeholder into the ETI District Heat project being developed by BCBC Sustainability.</p>
<b>Farming Connect</b>	<p>Medium</p> <p>Farming Connect provides farm and forestry businesses with advice, guidance, training and events.</p>	<p>Medium</p> <p>Any engagement with the farming community on renewable energy have been undertaken jointly with farming connect.</p> <p>Farming Connect are engaged with on work relating to the farming community to understand where we can add value and support each other's work but at the same time avoiding duplication.</p>
<b>Groundwork Wales</b>	<p>High</p> <p>Groundwork Wales are an environmental regeneration charity.</p> <p>Groundwork Wales have delivered an energy efficiency project called Green Doctors delivered through the Caerphilly RDP. Caerphilly RDP have also delivered a project called Sustainable Energy for Farming Households.</p> <p>Groundwork Wales also sit on the Bridgend Local Action and will be involved in the decision making process for project proposal send to the LAG for approval.</p> <p>.</p>	<p>High</p> <p>Groundwork Wales have shared best practice on the renewable energy and energy efficiency projects they developed from the last programme and there is potential for them to deliver this project in rural Bridgend.</p>
<b>Bridgend College</b>	<p>High</p> <p>Bridgend College are leading in the development and build of the proposed energy hub on their campus.</p>	<p>High</p> <p>Lead on the development of the hub project. The college have been engaged through the whole study process and have written the energy hub idea into their estates strategy.</p>

### 5.2.2 Potential Stakeholders

Stakeholder	Interest: <i>High/Med/Low</i>	Influence/Rationale: <i>High/Med/Low</i>
<b>Industry, Energy Companies/Utility providers</b>	<p>Medium</p> <p>The colleges construction department already has good links with industry.</p> <p>For the renewable energy hub project it will be important to have links with industry to understand the needs the industry require with regards to skills gaps and also to ensure that the latest technologies are demonstrated. Industry sponsorship is also something that could be considered as part of the project.</p>	<p>Low</p> <p>No engagement as of yet.</p>
<b>Welsh Government</b>	<p>Medium</p> <p>Welsh Government wish to see a more sustainable and energy efficient Wales as outlined in the Wellbeing for Future Generations Bill.</p>	<p>Medium</p> <p>The energy advice service priorities need to align with the Welsh Government Strategy outlined in the Wellbeing of Future Generations Bill.</p>
<b>Wales and West Utilities</b>	<p>Low</p> <p>WWU would only be interested in any element of this project that overlapped with the hydrogen fuel cell project.</p>	<p>Low</p> <p>The infancy of hydrogen technology mean that it is unlikely that the community would need advice on its installation any further than just information about the Ty Tanglwyst site.</p>
<b>The Dairy Development Centre at College Sir Gar</b>	<p>Medium</p> <p>The Dairy Development Centre at College Sir Gar have delivered energy efficiency projects within the dairy industry which trialled and tested through the last RDP for Wales 07-14.</p> <p>The proposed hub will not duplicate any work the dairy development centre</p>	<p>Low</p> <p>Any advice relating to energy efficiency in the dairy industry will be directed to the Dairy Development Centre and contact will continued to be made with regard to project development with the farming sector.</p>

<b>The Carbon Trust</b>	Low  The Carbon Trust aims to support projects that cut carbon emissions and costs.	Low  This project aims should signpost individuals to the Carbon trust and their services.
<b>Building Research Establishment (BRE)</b>	Low  BRE would like buildings to be as sustainable as possible reaching their BREEAM Excellence standard of construction.	Low  Any new build project or refurbishment should meet BREEAM standards.
<b>Communities First.</b>	Medium  Communities First will be engaged with issues relating to fuel poverty in Communities First areas of Bridgend. This will ensure any work will done will add value to their programme and avoid any duplication.	Medium  One meeting has been held with C1st to make them aware of the study.
<b>The Environmental Association of Universities and Colleges (EAUC)</b>	Low  EAUC are always interested in case studies that demonstrate a move towards living sustainability.	Low  EUAC would only be interested in hearing how the project progressed as information for its members rather than getting involved in the projects development.

## 5.5 Funding

The trial of this project could potentially be funded through rural Bridgend's LEADER funding subject to approval from the Rural Bridgend Local Action Group.

## 5.6 Project Scope

It is envisaged that the trial project will continue to establish an evidence base for the energy hub development and will aim to develop a joint approach the renewable energy and energy efficiency at a local level, and further establish and support communities with renewable energy installation advice and energy efficiency guidance.

The project will also aim to promote and provide energy advice for rural businesses and communities. The project will aim to have an impact locally by offering support for communities, aiming to reduce fuel poverty.

The project will aim to support all the rural communities in Bridgend, identifying further project opportunities for future projects both locally and opportunities for co-operation.

## 5.7 Outputs

The following outputs are expected from this project:

- 1 working trial to deliver a rural renewable energy and energy efficiency service
- 1 service delivery model created
- 30 businesses advised on renewable energy options per year
- 30 individuals advised on renewable energy options for their home per year
- 1 Renewable energy and energy efficiency network created

## 5.8 Outcomes

In addition to these outputs a range of longer-term outcomes are anticipated from this project. Essentially these are the main economic drivers behind this proposal:

- Greater uptake of renewable energy projects amongst the farming and local communities of Bridgend.
- Leading innovative community energy project within the Bridgend county borough
- Leading innovative farm energy projects
- Reduced energy costs for businesses and communities
- Reduction in fuel poverty
- Private investment in energy projects

## 5.9 Links to other Programmes, Projects and Investments

This project will aim to support the Welsh Government's pledge to make Wales a Low Carbon Economy – to maximise energy and environmental investment and bring economic benefits to business and communities. It will also support Communities First anti-poverty agenda.

This project will support UK energy policy as set out in the Energy White Paper of May 2007 and Low Carbon Transition Plan of July 2009. The current focus of policy is on reforming the Electricity Market, rolling out smart meters and improving the energy efficiency of the UK building stock through the Green Deal.

This project will support the Welsh Government's Green Jobs Strategy and Bioenergy Action Plan for Wales, which aims to generate 5 TWh per year of electricity, 20% of the country's current need from renewable biomass by 2020.

"Wales once led the world in carbon-based energy. Our goal now is to do the same for low carbon energy" (Welsh Government Cabinet 2010).

BCBC has adopted a Green Infrastructure approach to develop in its Local Development Plan (LDP). This ensures that the green (natural) infrastructure such as biodiversity and flood risk are considered equally with grey (built) infrastructure such as roads and sewerage within the planning process. The project will also support sustainable development through the adoption and encouragement of a green infrastructure approach to development and the

exploration of renewable energy solutions to meeting local needs. In turn these actions will begin to address rural poverty and a more sustainable economy, future proofing rural communities both economically and environmentally.

## 5.10 Viability

Risks:

There are relatively few risks associated with this project as it is a revenue-based trial project. However, it will need to have agreed target outputs in order to monitor progress as well as a solid understanding and vision of what it hopes to achieve as per its longer term outcomes.

The links between this project and the subsequent feedback this will provide for the renewable energy hub proposal at Bridgend College, Pencoed are essential to this pilot project, therefore, for a viable project to take place, the College will need to be engaged with the monitoring and reporting of progress, whether formally or informally in order to inform future service delivery.

It is important also to remember that while this might be a pilot project in preparation for the renewable energy hub idea, it will be dealing and engaging directly with residents of our rural communities and it is paramount that their needs are addressed in the here and now and that they are offered a first class service with clear economic and well-being advantages.

Some of the risks might include:

- A lack of uptake of energy audits. Awareness raising activity will be planned in order to help communities, and in particular, community venues to understand the advantages of engaging with this project, for example the long term costs savings that could be realised as a result of receiving this free service.
- A lack of engagement with the community to develop advisory strategies to meet their needs. A range of engagement activity will be required and planned that enables communities to express their needs and receive a bespoke service.
- The delivery agency fails to complete the commission. The project will be commissioned in such a way that an alternative agency can be commissioned to complete the delivery of the project.

## 5.11 Recommendations

R3. **It is recommended** that a pilot project is developed to offer independent energy advice for communities, produce evidence of advice and training needs, develop and trial a service delivery model. It is proposed that LEADER funding is sought for this pilot. Network

## 6. Ty Tanglwyst Hydrogen Fuel Project

### 6.1 Background

Two earlier projects that received funding from the RDP in rural Bridgend have led to this proposal. These were the consultation with local farmers and Future Farm Energy event which led to the production of the '*Farm Guide to Renewable Energy in Bridgend County Borough (2014)*' and the feasibility study for the '*Innovative Pilot Study to Design a Rural Energy System (2014)*'.

The second of these provided a detailed technical study of the Ty Tanglwyst dairy farm site to address its viability as a site for installing a hydrogen fuel cell system in a rural setting. This report looks at this project in the context of addressing wider rural needs and identifies the wider outcomes for this proposal.

### 6.2 Project Description

Fuel cells and hydrogen technologies can release the full potential of renewable energy. A hydrogen energy system can transform rural communities by overcoming two of the major stumbling blocks of renewables; namely intermittency and grid connection.

Hydrogen can be produced by the process of electrolysis (splitting water). Fuel cells use hydrogen to generate electricity and heat from safe electrochemical reactions with no combustion. The process is ultra-clean and dangerous toxic emissions are avoided. Annually, UK air pollution leads to an estimated 29,000 deaths and at an economic cost which exceeds £10 billion.

Versatility and practicality are two of the key benefits of hydrogen and fuel cells, with applications which range from consumer electronics to cars to buildings and power stations. The international markets for these technologies are forecast to surge.

Reach commissioned a hydrogen fuel study in the last stage of RDP. The study provides a detailed design for a dairy farm, Ty Tanglwyst, near Pyle and also provides an economic assessment for developing a highly innovative rural Hydrogen Village.

The focus of the study is Ty Tanglwyst, a dairy farm near Pyle which also has holiday cottage accommodation. The farm has high energy bills, is off the gas grid and relies on oil heating. Ty Tanglwyst has a range of existing and planned renewable technologies.

The study estimates that 31% of the output of from 500kW wind turbine would be required to supply a hydrogen microgrid consisting of 10 micro ( $\mu$ ) fuel cell CHP units delivering practical electricity and heat to Ty Tanglwyst's dairy, farmhouse and holiday cottages.

The pilot study has designed a rural hydrogen energy system for Ty Tanglwyst Farm based on the following technologies:

- Solar PV or Wind as the primary energy source
- Electrolyser to produce storable hydrogen from intermittent renewable electricity
- Hydrogen storage system

- Hydrogen pipeline supply
- Micro fuel cells which convert hydrogen into highly efficient and ultra-clean electricity and heat in buildings

The hydrogen energy system costs at Ty Tanglwyst are estimated at £495,000. The system would reduce CO2 emissions by 108 tonnes.

A hydrogen energy system for a village of 30 houses, each containing a fuel cell, would cost an estimated £1,200,000 and save over 260 tonnes of CO2. 93% of the output of a 500kW wind turbine would be required.

As a demonstration project it would inform policies which could lead to general financial incentives for hydrogen energy systems on the path to commercialisation. The project meets the aims of the Welsh Government's 2014 Green Growth Wales: Investing in the Future strategy.

### **6.3 Need for Project**

In the transition from fossil fuels to clean energy, fuel cell and hydrogen technologies are playing an increasing role across the world for applications of all sizes (from watts to megawatts). Hydrogen is the fuel (or stored energy) which fuel cells convert into useful electricity and heat by means of electrochemical reactions that do not involve combustion. The process of generating energy is, therefore, ultra-clean.

Versatility and practicality are two of the key benefits of hydrogen and fuel cells, with applications which range from consumer electronics to cars to buildings and power stations. The international markets for these technologies is forecast to surge, as evidenced by the Japanese Government setting a clear path for hydrogen and fuel cells within its new energy strategy.

Crucially, hydrogen and fuel cells can be applied to provide clean energy anywhere in the world. In both urban and rural areas, in both the developed and developing world, nations are facing major challenges of either grid constraints or no grid at all, These challenges are already starting to effect rural Wales. Rural Wales has the potential to develop large solar and wind installations, but the areas that have great potential for these renewable energy projects also correlate with the areas of poor infrastructure. In rural Powys for example planning has limited solar PV installation to just 4kw per property as the grid doesn't have the capacity to accommodate more. Hydrogen fuel is the perfect storage and transport solution to this problem in rural areas.

The flexibility and vision of the reach innovation funding (RDP 2007-2014) allowed this pioneering feasibility study to be undertaken putting reach and rural Bridgend at the forefront of this emerging technology. The willingness of Rhys Lougher to use his farm as an example site puts Bridgend at the leading edge of implementing this technology (a similar project is being developed in Scotland)..

### **6.5 Stakeholders**



### 5.1.1 Actual Stakeholders

This section identifies the key stakeholders outlining why they are a stakeholder, how they are affected by the project and the degree of their influence that is required over critical success factors.

Stakeholder	Interest: <i>High/Med/Low</i>	Influence/Rationale: <i>High/Med/Low</i>
<b>Reach Rural Development Team</b>	High  Leading on the research and development of this study and much research has been undertaken through the last RDP 2007-2014 on renewable energy.	Lead on this study.
<b>BCBC Sustainability Team</b>	High  BCBC Sustainability Team lead on council run renewable energy projects in the borough.  BCBC Sustainability Team ensures that council buildings and facilities are as sustainable as possible in construction and environment management systems are maintained. They lead on council run renewable energy projects in the borough, and enable residents to access Welsh Government & UK Government energy saving schemes, such as the current discount boiler scheme.	BCBC Sustainable Team have been engaged in all project development and have been advised where links can be made and value added to existing work and also identify gaps.  Links have been made between BCBC Sustainability and reach's projects on Future Farm Energy, Hydrogen Fuel Cells and Bridgend Energy Hub. Reach have also contributed as a stakeholder into the ETI District Heat project being developed by BCBC Sustainability.
<b>Farming Connect</b>	High.  Farming Connect provides farm and forestry businesses with advice, guidance, training and events.	Any engagement with the farming community on renewable energy have been undertaken jointly with farming connect.  Farming Connect are engaged with on work relating to the farming community to understand

		where we can add value and support each other's work but at the same time avoiding duplicatin.
<b>Wales &amp; West Utilities</b>	High  Welsh Government are looking for ways to create a lower carbon economy in Wales. They are a key driving force in the ETI District Heat Project and have been looking at the Hydrogen Fuel Cell project as another potential option.	High  There is interest in the Ty Tanglwyst Hydrogen Project because Hydrogen is seen as a potential low carbon technology but there is a lack of an experimental site to take this technology forward.
<b>Welsh Local Government Association, Welsh Government</b>	High  Wales and West Utilities are interested in diversifying their gas network now and in the future as North Sea gas declines. The network could easily be converted to hydrogen storage and transport.	High  Wales and West Utilities is keen to take the Ty Tanglwyst Hydrogen Project further as a stepping stone to develop this new technology.

#### 4.2.2 Potential Stakeholders

<b>Stakeholder</b>	<b>Interest: <i>High/Med/Low</i></b>	<b>Influence/Rationale: <i>High/Med/Low</i></b>
<b>Industry, Energy Companies/Utility providers</b>	High  The colleges' construction department already has good links with industry.  For the renewable energy hub project it will be important to have links with industry to understand the needs the industry require with regards to skills gaps and also to ensure that the latest technologies are demonstrated. Industry sponsorship is also something that could be considered as part of the project.	High  No engagement as of yet.
<b>Swansea University</b>	Low  This project is field leading and	Low  The universities are

	will be of interest to the academics interested in sustainability and alternative energy technology.	interested observes rather than direct contributors to this project.
<b>Cardiff University</b>	Low  This project is field leading and will be of interest to the academics interested in sustainability and alternative energy technology.	Low  The universities are interested observes rather than direct contributors to this project.
<b>Centre for Alternative Technology</b>	High  The centre will be interested to see how this ground breaking project progresses.	Med  They will be observes rather than direct contributors to the project.
<b>Building Research Establishment (BRE)</b>	Med  BRE will have an interest in any new technology that improves the sustainability of buildings and building systems.	Med  BRE will be instrumental to mainstreaming this technology across the building industry if it progresses past this pilot.
<b>Tata Steel.</b>	High  Tata Steel is interested in hydrogen fuel technology as they are considering a process to convert waste gases on site into hydrogen fuel.	Med  Tata are developing their own hydrogen project in parallel to this project. Advances in either project may influence the other.
<b>Bridgend College</b>	High  The college will be looking to showcase the hydrogen project as part of its renewable energy hub centre of excellence.	Med  The college will be one of the mechanisms of sharing the project so that people can learn about the technology.

## 6.7 Outputs

The following outputs are anticipated to be achieved from this project:

- Reduced energy costs at Ty Tanglwyst through using hydrogen fuel which also offers significant CO2 savings;
- A working example of a hydrogen fuel system on a working farm. Wales has no working example of this technology yet.
- A solution to the storage and transport of energy problem on sites with solar or wind generation.

- A solution to the problem of peak energy generation not occurring at the same time as peak energy need.
- An innovative pilot project that is needed to allow the energy to progress past the theoretical stage.
- A truly Wales if not UK leading project within Bridgend.

## **6.8 Outcomes**

The project has the potential to support rural communities by providing them with a cheap and plentiful fuel source - once initial system costs have been met. It also aims to provide that fuel through a system that is zero carbon.

The project is the first of its kind and is an important stepping stone in the development of hydrogen as a community fuel source. The project will be an exemplar site and could also act as a technology demonstration site for the Bridgend Energy Hub project if that was to go ahead.

The technology has around a ten-year payback period. A major economic driver for the project is reducing installation costs which will give much shorter payback periods and greater benefits to rural communities.

Converting energy to hydrogen fuel creates storage and transport opportunities for rural communities. Rural areas have great potential to generate energy from wind and solar PV, but the areas where that potential is greatest also correlates with the areas where grid infrastructure is poor. This project has the potential to be very significant if linked to another renewable energy generation project such as the installation of a very large wind turbine or several turbines.

## **6.9 Links to other Programmes, Projects and Investments**

This project will deliver the aims of the current UK energy policy which is set out in the Energy White Paper of May 2007 and Low Carbon Transition Plan of July 2009.

The project meets the follows development needs of the Local Development Strategy for rural Bridgend (RDP):

The SWOT analysis reveals that there are many opportunities available to develop renewable energy schemes. It recognises that a number of feasibility studies have already been undertaken in the County Borough supporting the adoption of renewables more generally for rural benefit for example in addressing rural fuel poverty. The natural resource available within the rural County Borough feature across all strategic objectives within the strategy due to the benefits it can bring which are highlighted in the SWOT analysis. That resource can bring a major added value in the form of a green infrastructure underpinning sustainable development and a vibrant rural economy.

This project contributes to Bridgend County Borough LDP Policy PLA4 'Climate Change and Peak Oil'. All development proposals will be required to make a positive contribution

towards tackling the causes of, and adapting to the impacts of Climate Change and Peak Oil. The project fits into the following means of achieving this:

1. Having lower carbon energy requirements by reducing energy demand, and promoting energy efficiency.
2. Encouraging the development of renewable energy generation.
3. Using resources more efficiently, and minimising waste water use and pollution.

## 6.4 Funding

A technical study and design has been undertaken for a hydrogen fuel cell system at Ty Tanglwyst Dairy Farm. There was a modular approach to the design which allowed the costing of the development of a hydrogen energy system for the wider community within the study.

- The farm installation was costed at £495,000 with a possible 10.8 year payback.
- The cost of a community installation was £1.2 million with a 10.5 year payback.

Though currently expensive to develop, the Welsh Local Government Association (WLGA) has added this project to their 'green infrastructure pipeline' list of potential funding projects if large government pots become available. It should also be noted that technological advance and mass production could significantly reduce costs, with much cheaper projects envisioned by 2020.

Through ongoing discussions, Wales & West Utilities have been identified as potential project and funding partners. They can apply for 90% funding for projects of this size. The funding is for innovative projects that will evolve the UK energy network and the money is only available to utility companies as the lead body. The Rural Community Development Fund is suggested as a match funding source for the Wales & West funding. The RCDF has a maximum limit of £160,000 per application, therefore it is recommended to develop a first phase project in order to keep within this maximum.

This project proposal is to apply for funding to implement the project designed in the pilot study. Wales and West Utilities have access to an innovation fund for utility companies that will allow it to apply for 90% of the funding. An application to the Rural Community Development Fund would be one option for securing some of the remaining 10%.

The following project costs were identified in the report '*Innovative Pilot Study to Design a Rural Energy System (2014)*'.

### Ty Tanglwyst Site

Designing the Ty Tanglwyst scheme the study estimates that 31% of the output from a 500kW wind turbine would be required to supply a 100kW electrolyser and a hydrogen micro-grid consisting of ten micro fuel cells ( $\mu$ CHP) units delivering practical electricity and heat to Ty Tanglwyst's dairy, farmhouse and holiday cottages.

The hydrogen energy system costs at Ty Tanglwyst are estimated at £495,000. This is dependent on further wind profile analysis and if this establishes that a 300kW electrolyser is need, then project costs could increase to £730,000. The system would reduce CO2 emissions by 108 tonnes.

Table 2 Ty Tanglwyst Hydrogen System Costs			
Item	Size	Units	Cost £
Electrolyser	100kW	1	175,000
Hydrogen Storage Tanks	50m <sup>3</sup>	2	60,000
Hydrogen Pipeline Grid	200m	-	35,000
µCHP Fuel Cells (inclusive of installation)	2kW	10	225,000
<b>Total</b>			<b>495,000</b>

The study estimates that 31% of the output from a 500kW wind turbine would be required to supply a hydrogen microgrid consisting of 10 micro (µ) fuel cell (CHP) units delivering practical electricity and heat to Ty Tanglwyst's dairy, farmhouse and holiday cottages.

Table 3.1 Ty Tanglwyst Hydrogen Energy System Electricity Assessment			
	Value	Units	Notes
Installed Capacity of µCHP Fuel Cells	20	kW	Based on the output of 10 fuel cells.
Electricity Output from Fuel Cells	166,440	kWh	Per annum assumes 95% availability of fuel cell
Heat Output from Fuel Cells	100,000	kWh	Assumes approx 50% utilisation of available heat
Electricity Input Required by Electrolyser	449,838	kWh	Sourced from wind turbine and fed to electrolyser.

The design for a hydrogen energy system for a village has specified a 30 house community. Each house would contain a fuel cell costed at £40,000 each including installation and infrastructure. Total costs for the village element of the study are estimated at £1,200,000 and reduce CO2 emissions by over 260 tonnes. 93% of the output of a 500kW wind turbine would be required.

The feasibility study at Ty Tanglwyst has produced the following project costs:

	Value	Notes
Hydrogen System Capital Cost	£495,000	1 x 100kW Electrolyser, 2 x 50m <sup>3</sup> Hydrogen Storage Tanks, 200m Hydrogen Pipeline, 10 x 2kW $\mu$ CHP Fuel Cells (inclusive of installation)
Electricity Cost	?	Electricity is supplied by the wind turbine
Electricity Sales	£18,142	Based on the displacement of imported electricity at an average unit price of 13p/kWh (includes CCL, FIT Levy, VAT) at farm.
Heat Sales	£5,500	Based on the displacement of heating oil cost of 5.5p/kWh at farm
Feed-in Tariff Revenue	£22,037	Based on current FIT rate of 13.24p/kWh for micro CHP
Total Electricity and Heat Value ex-FIT	£23,642	Excludes FIT revenue
Total Electricity and Heat Value with FIT	£45,679	Includes FIT revenue

This costs the whole hydrogen system at £495,000. It also calculates as income for the farmer based on electricity and heating costs saved combined the Feed In Tariff (FIT) revenue of £45,679. This does not take into account the cost of producing the electricity from the wind turbine. The original innovation study costed this as zero, but this is misleading as there would be a capital cost of installing the wind turbine. Even if the wind turbine has a calculated payback period where electricity generated and accompanying FITs pay the capital costs of its installation, any increase in that payback period through sending electricity to the electrolyser needs to be calculated as electricity costs for the hydrogen projects. These additional costs will affect the payback period on the £495,000 investment in this project.

As those wind turbine costs were not included in the Innovation Study, the following payback scenarios were calculated for the hydrogen project. Scenario 1 is the payback without FIT revenue. Scenario 2 was payback with a hypothetical 50% grant, as no grant is identified that payback scenario has been excluded below. Scenario 3 is the payback period for the project receiving FITs for CHP generation.

	Value	Units	Notes
Scenario 1 Payback from elec & heat excluding FIT	20.9	Years	No FIT revenue

Scenario 3 Payback with FIT	10.8	Years	Payback with FIT
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### Costs for Developing a Hydrogen Village

The project was designed to be modular, allowing the study to then go on to design a hydrogen village, with the following costs, savings and payback periods.

	Value	Notes
Installed Capacity of $\mu$ CHP Fuel Cells	45 kw	Based on output of nominal power of fuel cells
Electricity Output from Fuel Cells	374,490 kWh	Per annum assumes 95% availability of fuel cell
Heat Output from Fuel Cells	300,000 kWh	Assumes approx. 50% utilisation of available heat
Electricity Input Required by Electrolyser	1,349,514 kWh	Sourced from wind turbine
Hydrogen System Capital Cost	£1,200,000	Based on a hydrogen network of 30 connections @ £40,000 per connection and including all electrolyser, storage, pipeline, fuel cell and installation costs.
Electricity Cost	?	Assumes self-supply of electricity by wind turbine
Electricity Sales	£48,684	Based on the displacement of electricity in the homes at an average unit price of 13p/kWh
Heat Sales	£16,500	Based on the displacement of heating oil at a cost of 5.5p/kWh
Feed-in Tariff Revenue	£49,582	Based on the current FIT rate of 13.24p/kWh for micro-CHP
Total Electricity and Heat Value ex-FIT	£65,184	Excludes FIT revenue
Total Electricity and Heat Value with FIT	£114,766	Includes FIT revenue
Scenario 1 Payback Elec & heat excluding FIT	18.4 years	No FIT revenue
Scenario 3 Payback with FIT	10.5 years	Payback with FIT

Again, this does not factor in the cost of electricity coming from the wind turbine.



The project has submitted to Welsh Local Government pipeline of green infrastructure projects for funding. There is also scope for reducing costs by the economies of scale when developing projects with other counties. Powys for example has very poor grid connection with renewable projects limited to 4kW or less because of lack of capacity in grid infrastructure.

## 7.2 Viability

- There is a risk of missing the combination of funding opportunities with the potential to support this innovative project. Ideally, the project needs to be developed now to embrace this funding opportunity. The large project cost means that it is currently dependent on a WWU funding bid in May. It is also important to secure the 10% match funding so that the 90% innovation funding from WWU can be accessed.
- This is a time constrained opportunity not to be missed when the technology is still in development, considered innovative enough for the 90% funding and the project meets the renewable energy priorities of the Rural Community Development Fund.
- The project relies on a wind turbine being installed at Ty Tanglwyst to supply the energy. There is a risk of this not getting through the planning stage, but any noise objections are mitigated by the farm being next to the M4, and any visual objections are mitigated by the farm being within the aspect of the Tata Steel Works industrial site.
- There is a risk of local objection to a project of this nature, Ty Tanglwyst is engaged with the local community which to date has been supportive of its efforts to develop its business.

## Benefits

The Ty Tanglwyst project would firstly support communities to move away from a dependence on fossil fuels, and secondly provide a mechanism to solve the storage and transport of energy issue in rural areas. It is very innovative, has not been done before and will pave the way for similar projects in the future and further afield.

Natural gas from the North Sea is not expected to last past the next 50 years. The utility companies (especially the gas based providers) have a large and expensive infrastructure that is reliant on a gas based fuel system. Hydrogen fuel is a potential replacement for natural gas and could easily be utilised in the existing gas network with some modification. This would not only ensure the ongoing use of the gas network but also make Wales more resilient to the transition past the end of North Sea gas. As well as meeting the aspirations of Welsh Government and the utility companies, it also delivers the renewable energy priorities in the Rural Development Plan. A strong partnership has been put in place to take the project forward, made up of Wales & West Utilities, Ynni Glan, IRD, reach and Ty Tanglwyst. The project could develop into a regional project by bringing in Coleg Sir Gar's Dairy Supply Chain project and Carmarthenshire RDP to develop the project as a case study for dairy farms in South Wales.

## 9. Recommendations

- R4. It is recommended that **reach** and the Local Action Group continue to explore opportunities to develop hydrogen fuel cell technology and the potential to address fuel poverty and local community energy infrastructure identifying whether funding is available, strategic partners are in place and the business case is cost-effective. In addition, the Ty Tanglwyst site can become an innovative case study for students, industry and other farms to learn from if included within such a proposal.
- R5. It is recommended that connections are strengthened between the proposed renewable energy hub and the proposed hydrogen fuel cell project in order to cross-promote and share best practice as both are within the Bridgend County Borough area. Further links should be forged with Solcer House another example of a working demonstration site an energy positive house situated in the Tythegston area, and the first of its kind for the UK.

## 6. Timeline

Activity Year 1 2016		Ja n	Fe b	Ma r	Ap r	Ma y	Ju n	Jul	Au g	Se p	Oc t	No v	De c
Ty Tanglwyst	Expression of interest to RCDF.												
	Wales & West Utilities application to Utilities Innovation Fund.												
	Prepare brief for tender submissions.												
	Procurement process to select project tenders.												
	Start planning permission.												
Community	Leader Renewable energy for more sustainable communities' pilot project.												
	Study establishing community need for renewable energy services.												

Activity Year 2 2017		Ja n	Fe b	Ma r	Ap r	Ma y	Ju n	Jul	Au g	Se p	Oc t	No v	De c
Ty Tanglwyst	Complete architectural design, engineering design and planning permissions.												
	Construction and implementation of project.												
	Leaflet explaining project for visitors.												
	Official Launch Event.												
Community Project	Leader Renewable Energy for Sustainable Communities pilot project.												
	Design of service delivery based on study.												
	Trial of service delivery based on study.												
	Evaluation of service delivery model.												
	Evaluation Report												
Energy Hub	Tender for contractor.												
	Design of building.												
	Planning Permission												

<b>Activity Year 3 2018</b>		Ja n	Fe b	Ma r	Ap r	Ma y	Ju n	Jul	Au g	Se p	Oc t	No v	De c
<b>Ty Tanglwyst</b>	Study Tours												
	Marketing as an exemplar site.												
	Building linkages with Bridgend College Energy Hub.												
	Evaluation of project												
	Cost report of one year use.												
<b>Energy Hub</b>	Planning Permission												
	Schedule of site works.												
	Start of Construction maximising summer break.												
	Building linkages with Hydrogen Project.												
	Demonstrating construction elements to students as part of construction courses.												