Pweru'r Dyffryn

Using our local resources to power our local economy

Gweithgor Dyffryn Aeron Working Group

Energy Scheme

Report

Cyngor Sir CEREDIGION County Council

CYNNAL Y CARDI
Creating Sustainable Communities

Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig: Ewrop yn Buddsoddi mewn Ardaloedd Gwledig
European Agricultural Fund for Rural Development: Europe Investing in Rural Areas
LEADER
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The concept for the Pweru'r Dyffryn (Translation – Powering he Valley) scheme was developed by Gweithgor Dyffryn Aeron (Working Group). The original research, the subject of this report, has received funding through the Welsh Government Rural Communities - Rural Development Programme 2014-2020, which is funded by the European Agricultural Fund for Rural Development and the Welsh Government.

The aim of the Plan

The Pweru'r Dyffryn (translation: Powering the Valley) scheme was designed to find out if sustainable energy can be generated in the Aeron Valley - thus generating income to improve the economy of the whole area.

So concisely, the aim of the Ultimate Valley Power scheme is to:

- To create a sustainable income for the Community
- Generate benefit to the local economy to help maintain the cultural and linguistic structure of the Valley.
- Encourage the use of renewable energy that would achieve this

Method

LEADER support through the Cynnal y Cardi Local Action Group (administered by Ceredigion County Council) which is funded through the Welsh Government Rural Communities – Rural Development Programme 2014-2020 was secured to consult widely with communities in the Aeron Valley area, and then look at what would come from the consultation and seek to discover the best method(s) of developing a renewable energy project in the area in terms of viability. Most importantly was the need to create a scheme that would generate a sense of ownership amongst local people - that is, it was crucial to develop a scheme that would be supported by the people who would be most affected.

Consultation with Dyffryn Aeron Communities

Between October 2016 and September 2017, the Working Group led discussions amongst the Dyffryn Aeron communities in order to answer three questions:

Question 1

Is there a means of producing sustainable energy that you wouldn't want in this community – even if we owned it ourselves?

Question 2

What means of producing sustainable energy you think could be a good idea for us to develop ourselves in this locality?

Question 3

If we were to develop our own sustainable energy how could we use the income generated to strengthen our local economy?

In conducting the consultation activities, it has been important to reflect the linguistic balance of the area - that is, that people were given the opportunity to participate fully in their preferred language. The events took place through the medium of Welsh with translation facilities provided so that everyone was able to contribute fully to the discussions.

Aeron Valley

For the purpose of this project, the Aeron Valley was defined as the area that encompasses the following villages:

Llangeitho, Llwyn-y-groes, Bwlch-llan, Abermeurig, Llundain Fach, Trefilan and Talsarn, Creuddyn Bridge, Cribyn, Temple Bar, Felinfach, Ystrad Aeron, Dihewyd, Cilcennin, Cross Inn, Pennant, Ciliau Aeron, Neuadd-lwyd, Ffos-y-ffin, Aberarth and Aberaeron

An introduction on the website www.dyffrynaeron.wales/dyffrynaeron gives a demographic / linguistic picture of the area by parish.

The consultation process

It was intended to spread the opportunity to participate in the debate as widely as possible, enabling everyone in the community to voice their opinions. This was seen as an important step in ensuring that any emerging firm proposals and projects would be ones that would be based on the support of as many people as possible.

In order to achieve that, representatives of all communities were invited to act as facilitators, to lead a range of discussions in their communities, choosing the most

appropriate methods for them. Resources were provided as well as guidance to the facilitators in preparing for the consultations.

A Website was created, www.dyffrynaeron.cymru as a platform and storage place for materials and information to help the discussions.

A variety of consultation methods were used, including open meetings and questionnaires and door-to-door discussions, all supported by social media activity.

Public opinion (general)

Findings arising from the consultation

Question 1: Is there a means of producing sustainable energy that you wouldn't want in this community – even if we owned it ourselves?

MAIN CONCLUSIONS

- Several reported that they did not oppose any of the potential options, but that small scale schemes should be considered, rather than large-scale schemes that could affect the environment and landscape.
- Many residents indicated that they are not against any sustainable means of generating energy.
- Wind turbines are the least popular option.

OBSERVATIONS

- It was mentioned that some would not want to see a development that could be heard or smelt at home or in the garden.
- Some mentioned that they would not want to create energy through fracking or nuclear power, but these are not considered sustainable sources.
- The idea of using the Aeron river was mentioned as being symbolic of the life of the Valley – being a part of the history of the valley and used to improve the economic wellbeing of the valley – for example after it was straightened in the 30's for improving the land.

Question 2 - What means of producing sustainable energy you think could be a good idea for us to develop ourselves in this locality?

MAIN CONCLUSIONS

- The use of streams or rivers, tides and waves was very popular.
- Solar panels were also a popular choice.
- It was noted that environmental impact would need to be considered with any energy system that used the river.
- Air-source heating was identified as an additional option to the examples offered, as well as the idea of regular garden waste collection, composting with the associated potential sales of compost.

Question 3 - If we were to develop our own sustainable energy how could we use the income generated to strengthen our local economy?

MAIN CONCLUSIONS

- It should be aimed at creating neighborhoods that are self-sufficient in energy.
- Investment should be retained locally (potential income should not be lost to the area in the form of profit for large companies.
- There were a lot of ideas in terms of investing the income in social projects and in local services / facilities:

INVESTMENT IN SERVICES / FACILITIES

Investing in services affected by public funding cuts:

- public transport: buses, trains (e.g. solar energy trains), community electricity transport, road improvements
- invest in local schools
- providing evening bus transport for people who do not want to drive at night
- improve street lighting in some places

Invest in new facilities:

- bus stops with solar lighting
- electric power points to electric cars
- extend the cycle and walking route from Llanerchaeron to Lampeter

INVESTMENT IN THE LOCAL ECONOMY

Helping local businesses:

- create a kind credit union for small businesses to grow
- sell cheaper energy for local businesses
- help / training to enable local businesses to access new / wider markets through internet use

Promote bursaries to help small businesses grow new developments:

- offer opportunities to produce, process and sell local food products
- invest in a collaborative processing center to enable small producers to add value to their products
- maintain a mobile shop for rural communities
- invest in employing young people to be involved in sustainable energy projects
- apprenticeships for young people
- free parking

- invest in producing more sustainable energy, and selling the balance of generation to the national grid

INVESTMENT IN A SOCIAL BUSINESS IMPROVEMENT

Strengthening community activity:

- fund high quality events
- offer support to the local Young Farmers Clubs
- offer support to local branches of the Urdd, and sports facilities Co-operatives:
- hosting a pub / club / local produce shop / community centre / community cinema
- create a community orchard, or buy land for plots (allotments), or community farm

BENEFIT TO THE SOCIETY:

- training and education, e.g. children's learning how to be more self-sufficient, adult education
- youth work
- care or support for the elderly
- free Welsh classes for immigrants
- schemes for the benefit of the Welsh language
- help maintain community halls, e.g. offer them free electricity

INVESTING IN FAMILIES

- create a fund to provide cheap loans for people to improve the insulation at home, to avoid energy poverty
- buying solar panels for homes
- Keeping low energy prices for families, especially people on low incomes and the elderly
- Providing sustainable, affordable housing for local people - especially those on low wages
- local people to get a share of the profit from community owned commercial developments over time
- reduce the council tax bill for residents

CREATE AN INVESTMENT FUND

- committee to decide annually how to spend the money
- establish a fund to which local organizations could apply for funding

A summary of the main findings of the research:

- No nuclear
- No large (large-scale) wind turbines
- Use natural resources – particularly water / solar
- Projects should, in the main favour a series of small scale developments
- Projects should be large enough to make a difference
- Introduce an element of reducing energy use / effectiveness

Overall, there was a desire to do something in the area to create a sustainable income for the community and at the same time encourage more energy efficient use.

It is clear that there is considerable interest in the possibilities in terms of generating income from sustainable sources and put it to local community and economic development. Discussions around the ideas that could be explored were enthusiastic and creative.

The policy landscape - Wales and the world wide

Local / Community and renewable Energy Schemes are likely to grow in prevalence in the future. Some estimates predict that over half of our energy will come from sources that at least have part local ownership within the next two decades.

What drives this change is:

- The need to reduce the use of carbon based resources.
- The need to tackle climate change.
- The need to reduce over-reliance on sources of energy derived overseas.
- The need to re-connect production with the energy use.

The types of Community schemes that are currently operating:

- Schemes to reduce the carbon footprint of a local area.
- Community-owned renewable electricity installations.
- Community groups working collaboratively to use a renewable heat source.
- A community trial of smart meters, to raise awareness of energy consumption
- and much, much more ...

The benefits of community energy

- It reduces greenhouse gas emissions.
- Improve energy security.
- Support the local economy and create jobs.
- Keep the profits generated in the community.
- Re-connect people with how energy is generated and how they use it.
- Make renewable energy schemes more acceptable.

The UK and Wales governments have been supportive of community energy developments over the past decade, with policy measures to encourage and support community groups to act to contribute to carbon emission reduction targets. The main policy measures that have led to growth in community energy activity are the tax system for social enterprises and the Electricity Tariff (Feed in Tariffs or FITs) system that provides direct financial support for renewable energy schemes.

The Welsh Government's Renewable Energy policy statement remains clear:

As a nation, we are rich in energy resources. We want to harness those resources to create a more prosperous future for Wales.

Although issues such as climate change are challenges, they also present opportunities. We want to lead the change to low carbon and create a better future whilst maximising the long term benefits to Wales at every step of the way.

...

Our vision is to see all communities and businesses using locally generated electricity and heat, from a range of renewable installations, to supply local demand and reduce our dependence on central generation.

Welsh Government Website - November 2018

In September 2017 the Cabinet Secretary for Environment and Rural Affairs announced new, ambitious targets for energy generation in Wales:

- Wales to generate 70 per cent of its electricity consumption from renewable energy by 2030
- 1 gigawatt (GW) of renewable electricity capacity in Wales to be locally owned by 2030
- Renewable energy projects to have at least an element of local ownership by 2020

Although the Welsh Government and the UK still declare their support for new and community developments, the policy measures have been gradually reducing. For example, the Feed in Tariffs (FITs) system is likely to expire at the end of March 2019. It is not clear if, or what, it will replace it. Groups that have been supporting renewable energy developments make it clear that it will be much harder (although not impossible in all cases) for new plans to be realized if there are no practical measures to support developments.

Although there is less direct practical / financial support from the UK / Welsh Governments to implement plans, the timetable to develop plans is long and complicated - changes in the way policies are realized will come from time to time, but the main policy drivers are likely to remain - it is very likely that the need to develop renewable sources of electricity generation will remain as policy for a long time to come. It is important therefore to keep putting new plans forward the push the need for practical measures to implement them.

Moving forward

Based on what people in the Aeron Valley have said they would like to see happen, the focus turned to some possible solutions – based on the type of development model that could be deployed and the technologies (by also taking account possible limitations in terms of supply to the grid):

Gweithgor Dyffryn Aeron has set out a number of core principles by which any proposed development would be measured, namely:

- No nuclear developments
- No large (large-scale) wind turbines
- Make use of water resources (the Aeron river and streams running into it) and Solar
- Projects should, in the main favour a series of small scale developments
- Aim to protect and maximize the natural resources of the valley
- Projects should be large enough to make a difference
- Introduce an element of waste reduction / energy use / effectiveness
- Community / economic development should be a major consideration

The technologies

- Anything possible in the area (Wind in particular, but many other technologies are also possible).
- Grid capacity may be a barrier, but does not make finding a solution impossible.
- Need to re-focus on what is the priority in the Aeron Valley, which is:
    - Developments related to water - feeding Hydro - Aeron / streams.
    - 'Smart specialisation' - acting based on what we have as specific resources or challenges that we have,
    - AD to help answer a problem caused by farm slurry (see below)

Hydro technology

Hydro-electric power is both an old and a relatively simple technology, and like wind, one very much suited to the natural resources that we have in abundance in Wales. However, just because you have a stream or a river running through or near your community does not automatically mean you will have the ability to produce power from it. The best sites are those which have both a high flow rate (the amount of water passing down the river) and a high head (the amount of vertical drop in the water flow). Given the hills and mountains in Wales, we have lots of potential sites for large and small scale hydro-electric schemes, but they are generally in remote areas with poor grid connectivity, making export of the electricity prohibitively expensive. It is possible to build a hydro scheme on a river with a low head but high volume of water, but this 'run of river' technology requires more expense and a greater scale than the standard channelling of a proportion of the flow of a stream through a generator.

The amount of water flowing in a stream or river can be calculated by actual measurement or be estimated using specially developed software (LowFlows). The later software is complex and not publically available, so you will need to employ a hydro-energy with access to the software to make calculations of mean flows over the course of any one year. The flow estimates allow for a calculation of the amount of power that a turbine could generate and therefore its viability against the cost of installation.

Ownership of the stream or the land that it passes over is the next key consideration in the viability of a hydro site. Hydro schemes need to draw off some of the water in a stream and run it through a pipe to the turbine, and then discharge the water back into the stream below the turbine. This requires a trench to be dug in which to lay the pipework, which can run for many hundreds of yards, depending on the scheme. There are a number of additional civil engineering works, such as the construction of weirs to house the intake, and the turbine house itself, all of which will require specific consent from all landowners along the route of the stream. In addition, the diversion of water from a stream will also require the approval of Natural Resources Wales (NRW) and the taking out of a number of operating licences to extract and impound water. The ecological sensitivity of the stream will also be a major consideration in the decision on whether or not to grant planning consent for the scheme. Early consultation with all landowners and with NRW is therefore highly recommended.

The key elements are:

- Water / head flow
- Access / consent to land and subtraction
- Grid connection

There are many different types of Hydro production systems , but most small water schemes in Wales use the 'Penstock' system.

The grid connection can limit the size of the systems that could be practicable - a small Hydro system would be likely to produce up to @ 100kW - there is a strong possibility that these would be allowable within the restrictions that are active now (see note below).

Why do Hydro schemes fit with the aim of Pweru'r Dyffryn
In response to the principles set out above:

- The Hydro scheme (s) received a high level of support during the consultation
- Some landowners showed a particular interest and indicated that streams on their land could be suitable.
- There are old resources on the Aeron river in Aberaeron that could be suitable for the Hydro scheme - would require detailed research to consider these.
- The use of the Aeron was identified as a symbol of community development of this kind and an aspiration during the consultation .

Possible weaknesses / challenges:

- Adequate scale to make a difference
- Planning and regulation

Anaerobic digestion (AD)

Energy from organic waste can be generated through a process known as anaerobic digestion. AD is a process that causes the biomass feed - it can be in many forms such as food waste, straw and hedgerows, manure, etc. - is disaggregated by micro-organisms in an air container in order to produce gas that is potentially burned to be produced to heat and power production, and residues of anaerobic digestion that can be used as a fertilizer. AD systems have become increasingly common on farms, but there are now increasing examples of community AD projects in the UK and further afield. Farm AD systems are very common in other European countries - especially in Germany.

In recent years, the focus has been increasing on the damage to rivers resulting from run-off of slurry from farms into rivers. Farmers do not want to see this happen, but recent wet winters are a huge challenge for farmers to keep slurry from running off the surface of land during wet weather, when slurry storage capacity is also challenging.

The problem has been particularly prevalent in the Tywi catchment area, and to an extent in that of the Teifi also. The Welsh Government takes an increasingly firm

attitude to the problem - an attitude that is likely to be hardened again over the coming months and years.

The industry may have to take mandatory steps to find answers - although external environmental factors are often at fault.

Until now, the Aeron has not been under the spotlight as a problem catchment area, although recent statements by Natural Resources Wales suggest this may change.

One possible solution would be to develop an AD system (s) for treating slurry, generating electricity or heat and dry fertilizer as an output from the system.

The technology lends itself to cooperative models of electricity / heat production and fertilizers - one example of a relatively recent operational AD project is on a farm outside Wrexham, where the local community has had the opportunity to invest in the plan. (www.lowerparkfarmcoop.co.uk).

Examples throughout Europe cooperative schemes, where farmers are working together to process slurry collaboratively, and generate heat which is used in towns / villages locally. The fertilizers are usually given back to the farmers as payment for feedstock for the system (i.e. slurry) .

Why an AD solution is potentially suitable as part of Pweru'r Dyffryn

AD would potentially answer many problems and provide an opportunity to realize several of the requirements:

In terms of meeting the principles set out above:

- The scheme would mean the ability to generate electricity / heat at a scale that could make a difference in terms of investment in the community.
- It leads to waste reduction / more effective use of waste
- The welfare and health of the Aeron river is central to the plan, so it helps to protect it, and make the best use of locally available resources
- It may be helpful in meeting a possible future problem.

Possible weaknesses/ challenges:

- Planning and regulation
- The feasibility of carrying slurry
- The necessary financial investment (around £ 1.5m to realize the plan)

Connecting to the National Grid

Before developing a plan in full, Western Power Distribution (WPD) will need to be contacted in the first place to ensure that there is capacity on the network to take any additional electricity that would be generated. WPD does not release general information about the capacity of the network to take more electricity - an application must be made before a formal response is received, but the general belief is that there is not enough capacity in the grid locally to take new large scale electricity generation projects.

Ofgem, the industry regulator for power generation and distribution is currently developing and modifying its policy of handling the continued growth that is likely to be seen in electricity generation from renewable sources. It has developed a program that encourages innovation in the way local electricity networks can work to handle renewable and local generation.

Renewable energy is not just about electricity generation. A number of AD schemes, for example, focus on using local systems to use the heat directly, rather than turning heat into electricity.

Therefore, although capacity in the grid is potentially a barrier to the development of large electricity schemes, this should not necessarily be a barrier to the aspirations of Gweithgor Dyffryn Aeron Working Group and the people of the Aeron Valley expressed through this project.

Feed in Tariffs

In terms of project funding, one key issue to consider is that the current Feed in Tariff (FIT) system will no longer be open to new projects from April 2019. Under the FIT scheme a generator receives 2 payments:

1) production payment for each kWh produced
2) export payment for each kWh exported to the grid (which is fixed)

Given that any new plan will take 12-24 months to be commissioned, it is clear that new projects development in the Aeron valley will not qualify for FIT support.

Unless a replacement to the FIT scheme is introduced then income will have to come from a Power Purchase Agreement with an energy supplier. Having to operate without the guaranteed generation & export subsidies, on the sale of electricity alone, with the relatively high capital cost of hydro, may be a challenge.

There was a recent announcement that the government is thinking about this issue and may be considering retaining the export payment element of the FIT scheme. This would at least give a guaranteed income level but there is as yet no information on whether this will apply to all technologies and for how long.

he UK Government has not yet stated what will replace the FIT. It is possible that they choose not to introduce any policy instrument in its place, but this would probably have a detrimental effect on the ability for small producers, including some community schemes, to be able to operate successfully. This would mean disrupting the ability of Government (UK and Wales) to realize their policy ambitions in this area, so we will wait to see how Governments at all levels respond.

With the Welsh Government's targets in particular being ambitious, it will need to work closely with producers and community groups to find solutions, if their policy outcomes remain as ambitious.

Therefore, even though the withdrawal of the FITs programme is a potential barrier, it should not be a barrier to the development of potential projects in the Aeron Valley, bearing in mind local and renewable energy projects will be required in future, so governments, industry and communities will need to find solutions to any delivery barriers.

Creating a platform for action

Looking at the aspirations of the Aeron Valley, and the type of technologies that could be developed, it is possible to start planning for the creation of a programme of work that will lead to a development plan.

Before doing so, a structure must be created with a clear vision, which will reflect the desire to make a difference in the Valley.

Here is a rough breakdown of the type of development models possible, and some of the challenges or opportunities for future projects under Pweru'r Dyffryn,

Type of development model	**Possibilities / Challenges for the Working Group**
• Create a development body that would provide a service to local customers - to encourage reduced energy use or enable reduced energy costs. Perhaps act as a point of information for local landowners / interested homeowners interested in developing small renewable energy schemes (e.g. solar, hydro, wind, etc.)	• This type of organisation already exist - easy to develop and launch - difficult to commercially finance / possibly fewer opportunities to generate commercial income.
• Local electricity or heat generation- created a resource / asset owned locally and generates electricity / heat to generate income directly. The organisation could look at the possibility of creating a Hydro or AD project or wind scheme (operating within the principles set by the people of the Aeron Valley).	• Long term development / time to plan / low FITs. Increased potential for ownership and income creation.
• Local delivery – electricity discount systems from national producers.	• Difficult where there are no large producers - unlikely to happen at community level.
• Micro-grid - Grid created alongside the National Grid	• Long term and costly. Potentially very rewarding in the long run, but it really needs a lot of commitment
• Virtual local network (e.g. Local	• New / innovative development - still being piloted. Reduced investment -

Energy) - create a market for the energy that is already being produced	new possibilities arising from them.

We believe there is room to develop a plan in the Aeron Valley that would operate across the first two points in the table above. We are looking to create an organisation that will be the driver of the development of a practical energy scheme, which would be a platform to attract funding and local investment for the development, and underpin economic / environmental developments that would make a real difference in the valley.

There is support and desire in the Valley to see such a programme being developed locally, and despite the challenges in delivering the plan, we feel that there are plenty of opportunities, enthusiasm and resilience to deliver a program of work that will be able to have a positive effect for the long term.

Creating a Development Trust

We recommend creating a Development Trust - a non-profit community company, to start to work on the development.

Development trusts are operating organisations that are:

- community-based, community-owned and community-led
- involved in economic, environmental and social regeneration of a defined area or community
- independent but seek to work in partnership with other private, voluntary and public organisations
- self-sufficient and not for private profit.

There is no specific form of legal structure, and a development trust can be registered as a company limited by guarantee, a community interest company, or an industrial and provident society. Many register as charities.

An example of a Development Trust is Renew Wales, which provides assistance to community groups to realize renewable energy schemes. Renew Wales is part of the Wales Association of Development Trusts network. We recommend joining that Society, and requesting support from Renew Wales.

Partnerships

In developing the plan further, we intend to join, or cooperate with a number of partners that will be able to help us deliver our plans, for example:

- Official:
  - Renew Wales. A Development Trust that is a network of community groups in renewable energy, which gives groups practical help to implement their plans.
  - Community Energy Wales - Community Energy Wales is a not-for-profit organisation for members set up to provide support and voice to community groups working on energy projects in Wales.
  - Carmarthenshire Energy / Severn Wye Energy - community groups that are experienced in supporting numerous community projects to establish and successfully operate for several years.
- Informal
  - Wales Association of Development Trusts; OFGEM; Western Power Distribution; A number of other partners in the private, public sector and third sectors.

Recommendations and possible next steps

We believe there is room and enthusiasm to see the development and establishment of a renewable energy development scheme in the Aeron Valley.

Gweithgor Dyffryn Aeron wishes to develop a plan that will include elements of renewable electricity generation or heat, using water and / or Anaerobic Digestion technologies

We recommend the formation of a new organisation, which will be a Development Trust to drive forward the development. The Development Trust will lead the development of the plans further and will enable the economic/ community plans identified during the consultation.

The Trust will commit to a number of fundamental principles in the development of energy plans, which will ensure that the communities of the Aeron Valley have led the development work from the outset.

We accept that the development of the scheme will be a long-term work with a number of challenges.

There are some early stages that will be taken as final steps in the first part of the project, including:

i. Mapping water resources effectively as possible (by consulting with landowners to seek possible sites and further exploring the potential resources in Aberaeron)
ii. Further consultation with farmers in the area when looking at the possibilities for an AD scheme for slurry in the area.

Our principles :

- No nuclear developments
- No large (large-scale) wind turbines
- Make use of water (the Aeron and others) and Solar
- Projects should, in the main favour a series of small scale developments
- Aim to protect and maximize the natural resources of the valley
- Projects should be large enough to make a difference
- Introduce an element of waste reduction / energy use / effectiveness
- Community / economic development should be a major consideration

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- And mainly for the people of the Aeron Valley for showing interest, taking part in the debate and showing enthusiasm in discussing a sustainable future for the valley.