

Committee: **Executive Committee**
Date of meeting: **22nd September 2021**
Report Subject: **Investment in Micro-Hydro Development**
Portfolio Holder: **Councillor D. Davies, Executive Member for
Regeneration and Economic Development & Deputy
Leader**
Report Submitted by: **Amy Taylor, Team Manager Regeneration
Opportunities**

Reporting Pathway								
Directorate Management Team	Corporate Leadership Team	Portfolio Holder / Chair	Audit Committee	Democratic Services Committee	Scrutiny Committee	Executive Committee	Council	Other (please state)
23.08.21	26.08.21	07.09.21			15.09.21	22.09.21		

1. Purpose of the Report

- 1.1 To provide members with an update on progress of the Micro-Hydro Feasibility Study for Cwm and Llanhilleth wards and seek approval for the next steps for this part of the Project.

2. Scope and Background

- 2.1 In October 2015, the Council's Executive Committee received a report on the proposed development of a Regeneration Energy Projects Programme and agreed to support the proposal for the Environment and Regeneration Directorate to continue the development of a series of Projects.

- 2.2 The series of Projects were to be designed in order to address a number of challenges including:

- Supply of lower cost energy (smarter selection of providers);
- Reducing energy losses (such improvements to building fabric);
- Reducing usage through behavioural change (using less); and
- Potentially through the generation (and movement) of energy.

- 2.3 Aligned to this, Regeneration has a commitment to managing a sustainable future energy delivery programme to allow a choice of affordable energy and to reduce fuel poverty for future generations, with the aim of:

- Improving the choice of supply;
- Developing models that enable community ownership of energy; and
- Meeting the energy needs of vulnerable households.

- 2.4 A range of measures are in place, as part of efforts to mitigate these key challenges and meet the aims set out within the Corporate Plan, including:

- Development of a local energy prospectus, as a tool to prompt and stimulate proactive engagement with the energy sector;
- Managing a research and development programme, to support delivery of affordable renewable energy provision for business, commercial and communities; and
- Exploring collaborative working opportunities to stimulate development including partnership working across the commercial, industrial, private and public sector.

2.5 As part of these measures, the Regeneration Opportunities Team have been exploring the potential to develop a range of renewable energy generation opportunities, including small scale hydro (micro-hydro) generation projects across the Borough.

2.6 Hydropower Generation is the term used for harnessing the energy stored in moving water and converting it into useful energy. The two main elements affecting the amount of energy that can be produced are the flow rate of the water and the height that the water will drop (the 'head'). Micro-hydro is generally defined as having an output of between 2 and 50kWp (power at full capacity).

2.7 In 2017, Carbon Trust reported on Hydro potential in Blaenau Gwent as part of a borough wider study of potential renewable energy generation including wind, solar and hydro schemes. Subsequently in 2018, researchers at Cardiff University were tasked with identifying sites worthy of further exploration for hydro generation. Through this work Cardiff University identified eleven sites for further identification.

2.8 The eleven sites identified by Cardiff University were further narrowed down by researchers at Bangor and Dublin Universities under the Dŵr Uisce project. Researchers used the estimated flows provided by Cardiff University to determine suitable turbines and the payback they would represent. Sites with high paybacks were ruled out leaving the below sites remaining:

- a) Anvil Court
- b) Sirhowy Tributary
- c) Cwmtillery Lake
- d) Carno Reservoir
- e) Silent Valley

2.9 The sites above were then identified as potential projects within the Blaenau Gwent Energy Prospectus which was approved by Regeneration Scrutiny Committee and Executive Committee in December 2019.

2.10 In September 2020 an application was submitted to the Welsh Government Rural Communities – Rural Development Programme under the LEADER scheme for funding to undertake a Community Hydro Study of potential opportunities within the electoral wards of Llanhilleth and Cwm.

- 2.11 The funding was awarded in December 2020 and together with funding from within the Council we issued a Contract Notice for a supplier to undertake two work packages:
- A review of the sites previously identified through the work of Cardiff and Bangor Universities and develop full feasibility studies for up to two sites.
 - Review sites within the Cwm and Llanhilleth Wards to identify potential opportunities and select up to two sites to develop full feasibility studies.
- 2.12 As a result of the tendering process, a preferred supplier: Dulas Ltd were appointed to undertake the two work packages as detailed above. As a result of funding deadlines, Dulas started with analysis of the Cwm and Llanhilleth Wards and this report will cover the outcomes of this work package. A further report will be presented to cover the second work package and sites identified within the Energy Prospectus later this year.
- 2.13 Under the commission Dulas were asked to provide full feasibility studies for up to two sites worth further investigation and their objectives were to:
- a) Establish all sites with the potential for hydropower from an initial desk based assessment;
 - b) Site walkover visit and confirmation/revision of layout options;
 - c) Undertake catchment analysis and hydrological estimation of flow data;
 - d) Review technical options;
 - e) Estimate power output and energy generation for each site;
 - f) Carry out initial consultation with Natural Resources Eales, Western Power Distribution and the Local Planning Authority.
 - g) Estimate budget costs and revenue
- 2.14 Dulas have identified two schemes worth further investigation which are:
1. Cwm Cnyw
 2. Cwm Big

Cwm Cynw

- 2.15 The Feasibility Study identified there is potential for a 15 – 25kW hydro scheme at Cwm Cynw with a power output of 17kW and average generation of 55MWh a year. This is the equivalent of powering 14 average homes for a year.
- 2.16 The scheme design is based on an intake 200m or so upstream from where the stream enters the culvert and a powerhouse next to the railway line in 'Granny's Wood'. The pipeline would be ~ 1,000m in length and run behind houses and across a brown-field site next to the Pit Head Baths, before crossing the B4471 via an existing underpass which is used to access

'Granny's Wood'. Please refer to **Appendix One** for site location plan and proposed site layout plan.

2.17 Dulas has provided estimate budget costs for the scheme based on quotes for equipment and grid connection costs from Western Power Distribution (WPD). The estimate cost of the scheme ranges from £120k to £240k based on a lower and upper estimate of costs based on the type of technology and equipment options available. The proposed scheme would have a design life of around 40 – 50 years. Please see **Appendix Two** for a breakdown of the costs.

2.18 Dulas has modelled the annual revenue based on a range of scenarios which includes:

- Export only at a rate of 5.5p/kWh - £3,025
- Sleeved Power Purchase Agreement (PPA) at 11p/kWh - £6,050
- Internal PPA at 13p/kWh - £7,150
- Internal PPA during a wet year at 13p/kWh - £7,930
- Internal PPA during a dry year at 13p/kWh - £6,110

Cwm Big

2.19 The Feasibility Study identified there is potential for a 20 – 30kW hydro scheme at Cwm Big with a power output of 28kW and average generation of 62mWh a year. This is the equivalent of powering 16 average homes for a year.

2.20 The scheme design is based on an intake just inside the Cwm ward boundary at Aberbeeg and a powerhouse near the A4046. The pipeline would follow an existing forestry track that services Natural Resources Wales (NRW) Cwm Big plantation. The Feasibility Study identified there is plenty of space for site compounds and construction access which would make the construction process straight forward. Please see **Appendix Three** for site location plan and proposed site layout plan.

2.21 Dulas has provided estimate budget costs for the scheme based on quotes for equipment and grid connection costs from WPD. The estimate cost of the scheme ranges from £150k to £350k based on a lower and upper estimate of costs based on the type of technology and equipment options available. The proposed scheme would have a design life of around 40 – 50 years. Please see **Appendix Four** for a breakdown of the costs.

2.22 Part of the reason for the difference between the lower and upper cost estimates for this scheme is due to the grid connection cost. Currently there is only a single phase supply to the nearby dwellings with a grid pole near the culvert entrance. This would need to be upgraded for the new grid connection which would consist of laying a new HV cable in the verge of the main road near the medical centre to a pole near the powerhouse plus installation of a 50kVA pole mounted transformer. The budget estimate received from WPD for this is £100k plus VAT.

2.23 Dulas has identified another option which could be considered for the grid connection which is a split phase connection. Dulas has indicated this option could reduce the cost of the grid connection. WPD have confirmed they will not carry out further assessments of the options without the Council commissioning a feasibility study.

2.24 Dulas has modelled the annual revenue based on a range of scenarios which includes:

- Export only at a rate of 5.5p/kWh - £3,410
- Sleeved PPA at 11p/kWh - £6,820
- Internal PPA at 13p/kWh - £8,060
- Internal PPA during a wet year at 13p/kWh - £9,490
- Internal PPA during a dry year at 13p/kWh - £6,500

3. **Options for Recommendation**

3.1 This report will be considered by the Regeneration Scrutiny Committee on 15th September 2021, and any feedback will be provided verbally to the Executive Committee.

Option One – Do Nothing

3.2 The Council could choose not to take these schemes forward for further investigation and development. The projects would be closed from the current point and would only be revisited should costs significantly reduce or new technologies become available.

Option Two – Proceed with further investigation and development of one scheme

3.3 This option would consist of the Council moving forward to business stage with one of the two schemes identified. Due to the complexities of the grid connection issues at Cwm Big it would be easier to move forward with the Cwm Cynw scheme in the short term. The WPD Feasibility Study for the grid connection at Cwm Big could be commissioned at the same time to allow for full understanding of the scheme costs.

3.4 It would require the Council to secure some initial capital funds for the development of a detailed Micro-Hydro scheme to enable the preparation of a business case to proceed. This would include procurement of technical design services and surveys required with a view to developing a business case for installation and commissioning stage. As outlined in section 5 it is expected that between £15k to £30k would be required for the business case development.

3.5 Even with further work to develop the business case it is not likely that the system size would increase significantly beyond the current estimates of 17kW if at all.

Preferred Option – Option One

- 3.6 The preferred option based upon the findings of the feasibility study is Option One. Whilst the development of hydro generation would provide some renewable energy to support local energy demands the level of production is extremely low when compared to the level of investment required for its initial development and ongoing operations. The scheme at Cwm Cynw offers the best potential but even with this it is likely to only be able to accommodate a 17kW system. By way of comparison a general domestic shower would be around 10kW.
- 3.7 It is therefore recommended that Scrutiny endorse the preferred option to not proceed further with investigations into hydro generation within the Cwm and Llanhilleth wards.

4. **Evidence of how does this topic supports the achievement of the Corporate Plan / Statutory Responsibilities / Blaenau Gwent Well-being Plan**

Future Wales: The National Plan 2040

- 4.1 Future Wales: The National Plan 2040 was released in February 2021 and it is the framework for planning the change and development needed in Wales over the next 20 years. It will be used to guide planning decisions made in Wales across a range of areas including energy supplies.
- 4.2 Every house and workplace needs heat and energy. Future Wales aims to get them in a clean way. This means using ways that don't involve things that are running out and bad for the environment such as coal and oil.
- 4.3 Welsh Government has set the following targets for the generation of renewable energy:
- For 70% of electricity consumption to be generated from renewable energy by 2030
 - For one gigawatt of renewable energy capacity to be locally owned by 2030
 - For renewable energy projects to have at least an element of local ownership from 2020
- 4.4 One of the future Wales Outcomes is to create 'A Wales where people live in places which are decarbonised and climate-resilient'. Decarbonisation commitments and renewable energy targets will be treated as opportunities to build a more resilient and equitable low carbon economy, develop clean and efficient transport infrastructure, improve public health and generate skilled jobs in new sectors.
- Policy 17 – Renewable and Low Carbon Energy and associated infrastructure.*

4.5 Welsh Government strongly supports the principle of developing renewable and low carbon energy from all technologies and at all scales to meet our future energy needs.

Well-being of Future Generations (Wales) Act 2015

4.6 Welsh Government 'Well-being of Future Generations (Wales) Act 2015 – directly aligns with local renewable energy generation. Under The Act it states:

'A prosperous Wales' goal, striving towards creating an innovative, productive and low carbon society, which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work'.

4.7 There is also a direct link to the well-being goal for 'A globally responsible Wales' in tackling climate change. The Act encourages long term generation thinking by public bodies to improve the economic, social, environmental and cultural well-being of Wales.

Blaenau Gwent County Borough Council Corporate Plan Refresh 2020-2022

4.8 This topic supports the achievement of the Council's Corporate Plan Refresh 2020-2022 in the following areas:

- To create strong and environmentally smart communities we are taking a strategic approach to the management of our land in different ways;
- To be a carbon neutral Council by 2030;
- To develop a portfolio of potential energy opportunities to deliver economic, business and community benefits; and
- To develop a more commercial organisation to generate income and deliver cost reductions to make local services sustainable and raise money to re-invest in our priorities.

Energy Prospectus

4.9 The Energy Prospectus identified opportunities for energy projects across Blaenau Gwent including hydro powered energy generation, Wind Energy generation, EV charging infrastructure and district heating. The proposed Micro-Hydro scheme is one of these opportunities.

5. Implications Against Each Option

5.1 Impact on Budget

The cost estimate breakdown for the schemes are contained in Appendices Two and Four. Final costings will not be known until a full detailed scheme design including identification of the technology to be purchased has been undertaken.

Option One – Do Nothing.

5.2 There would be no financial costs associated with Option One.

Option Two – Proceed with further investigation and development of one scheme

5.3 Financial costs associated with Option Two will depend upon the final size of the scheme, complexities of the scheme and who is appointed to undertake the work. For the purposes of this report we have assumed that the scheme would remain at 17kW.

5.4 The detailed design stage of the Project would cost between £15k to £30k. This would be used to support development of an overall business case for the implementation of the scheme.

5.5 As the focus is on providing the energy generated to the local community it has been considered that the energy generated from the Cwm Cynw scheme could be provided to either Llanhilleth Industrial Estate or Llanhilleth Institute. This would be based on the sleeved PPA scenario above. However, this would only generate approximately £6,000 p.a.

5.6 The table below provides a simple payback analysis of the project. It shows that the project would have payback of around 40 years.

Total Capital Cost	£240,000
Annual Revenues	£6,000 p.a.
Simple Payback	40 Years

5.7 The costs and payback period calculated above do not make provision for operational costs and lifetime replacement costs. Although the turbines could last up to 40 years within this lifetime there will be parts that will require replacement. This could include major replacements e.g. main turbine. The life and/or maintenance requirements of the pipework is currently unknown.

Risk including Mitigating Actions

5.8 There is a risk that once the detailed design stage has taken place that the Council decides not to take these scheme forward.

5.9 There is a risk that planning consent and abstraction consent is not be approved for the project. Blaenau Gwent County Borough Council would be the planning authority for the project. If the planning consent is refused there would be no opportunity to appeal the decision.

5.10 There are risks around landownership for the project. The land that the pipework and infrastructure will need to cross is currently in mixed ownership therefore negotiation and agreement with landowners will be required in order for the project to proceed.

5.11 Although technology continually improves there is a risk that there would be noise pollution to nearby receptors. The turbine when operating may

generate noise that could present a slight disturbance to nearby properties. This may result in negative feedback from local residents in close proximity.

5.12 There is a risk that ongoing maintenance would likely be high and whilst the turbine would have an overall life of around 40 years it would need some significant replacements of parts during this period.

5.9 Risk will be managed throughout the project in line with the Council's risk management strategy and a risk register shall be established following approval of this report.

Legal

5.10 Procurement to appoint suitably qualified consultants was completed in line with the Council's Contract and Procurement Rules (CPRs) and Procurement regulations. The procurement was advertised on Sell2Wales and other required platforms.

Human Resources

5.11 Project management would be led within Regeneration with support from other departments including Finance, Procurement, Estates and Planning.

5.12 Technical and design support will be provided from within the Council's technical service team where possible and where parts of the technology are outside of their area of expertise support will be sought from Welsh Government Energy Service and/or external technical specialists in the area of hydro generation technology.

6. Supporting Evidence

Performance Information and Data

6.1 Welsh Government have set the following targets for the generation of renewable energy across Wales:

- For 70% of electricity consumption to be generated from renewable energy by 2030.
- For one gigawatt of renewable energy capacity to be locally owned by 2030.
- For renewable energy projects to have at least an element of local ownership from 2020.

6.2 Alongside installation of the Micro-Hydro scheme we would also look to monitor overall performance, energy generation, carbon savings and financial savings. Performance monitoring arrangements will be established during the development stage of the Project and would start being monitored once the installation has been commissioned.

Expected outcome for the public

6.3 Increasing the amount of renewable energy generated locally and providing this to the local community will help reduce fuel poverty for local businesses and allow them to benefit from access to local renewable energy sources.

6.4 By offering the community green bond shares in the Project through the CMI scheme will provide community ownership of renewables and raise awareness of the work the Council is undertaking with local residents.

6.5 Increasing local renewable energy will also help to reduce the amount of carbon the Council utilises and our impact upon the global environment.

Involvement (consultation, engagement, participation)

6.6 Council Officers have been providing support and background information of the ward areas to consultants Dulas and feedback on proposed schemes. Recommendation of sites from Elected Members were provided to Dulas to investigate.

6.7 Officers from within Technical Services have been consulted on this report and have confirmed that they support the preferred option of this report.

Thinking for the Long term (forward planning)

6.8 Targets around renewable energy have been set by Welsh Government and these will also be supported by Carbon Reduction targets. Development of locally owned renewable energy will help Blaenau Gwent meet these targets.

6.9 The Council has declared a Climate Emergency and in order to decarbonise for the future we need to look for a range of projects including renewable energy generation and energy efficiency.

Preventative focus

6.10 Climate change can be prevented by reducing our overall impact upon the Planet. Increasing locally generated renewable energy would help to reduce our overall impact and mitigate against climate change.

Collaboration / partnership working

6.11 Opportunities for collaboration with partnership working will be explored with a range of potential partners including Dwr Cymru and potential local energy users.

Integration (across service areas)

6.12 Officers from across several service areas have been involved in discussions on the project and kept up to date on progress. It is intended that officers will continue to be involved throughout the development of the designs and overall business case for the Project.

6.13 The Team Manager Natural Environment has participated in discussions with the consultants Dulas and given support for the Cwm Cynw Scheme which would link up with the active travel route at 'Granny's Wood'. Opportunities to utilise the energy generated by the scheme locally have been considered. The more energy that is used locally the more the financial case for the Project improves. This will be discussed further in the impact on budget section of this report.

Decarbonisation and Reducing Carbon Emissions

6.14 Development of renewable energy generation will support the Council to meet its decarbonisation targets and support overall reduction of carbon emissions.

7. Monitoring Arrangements

7.1 Monitoring of the project will be done through the Council's business plan reporting process and by providing progress reports through the political process.

Background Documents /Electronic Links

- *Appendix One – Cwm Cynw Site Location Plan and Proposed Site Layout Plan*
- *Appendix Two – Cwm Cynw Cost Breakdown*
- *Appendix Three – Cwm Big Site Location Plan and Proposed Site Layout Plan*
- *Appendix Four – Cwm Big Cost Breakdown*