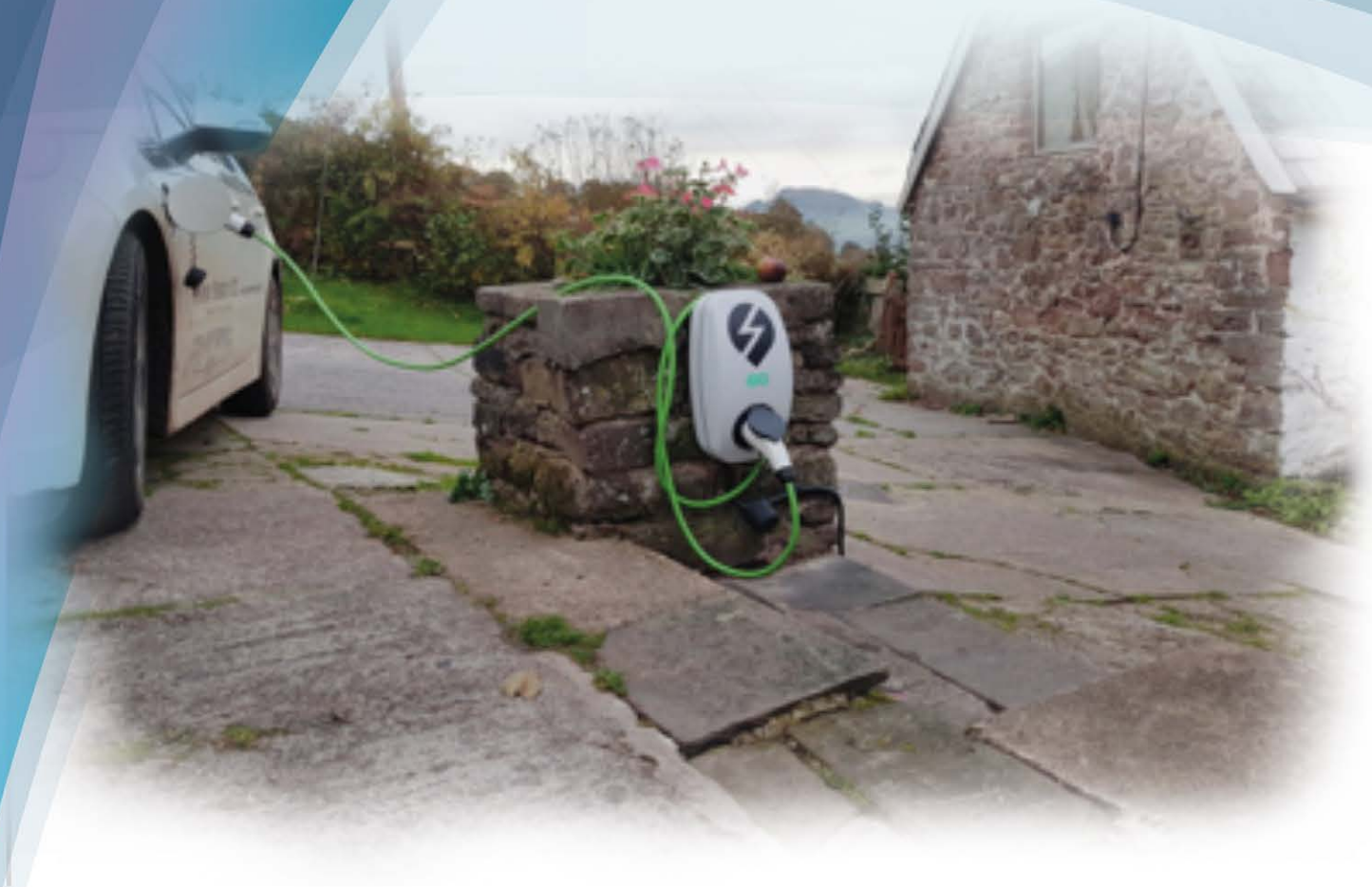
Financing Community Energy Case Studies:

Gwent Energy CIC



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Authors

Iain Cairns and Matthew Hannon,
University of Strathclyde

Tim Braunholtz-Speight, Carly McLachan, Sarah Mander, Edward Manderson and Maria Sharmina,
University of Manchester

Jeff Hardy, Grantham Institute, Imperial College London

Please contact Dr Matthew Hannon for more details about the project: **matthew.hannon@strath.ac.uk**

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Front cover image

Figure 1 – Gwent Energy-installed EV charging point and solar panel at a campsite (Source: Gwent Energy CIC, 2019d)

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Preface

Financing Community Energy project

Commencing in 2016, the Financing Community Energy project aims to provide the first systematic quantitative and qualitative analysis of the role of finance in the evolution of the UK community energy sector. It is led by the University of Manchester, working with the University of Strathclyde and Imperial College London, and forms part of the UK Energy Research Centre (UKERC) research programme.

The project involves a literature and data review, analysing the development of community energy to date; a UK-wide survey and statistical analysis of community energy finances and business models; in-depth case studies of a range of community energy business models in practice; and an ongoing stream of policy and practice engagement.

This report presents the third of four case studies of UK community energy organisations conducted during 2018/19. These will later be included as part of a synthesis briefing alongside a series of sector-level interviews. The case study makes use of a combination of qualitative (e.g. interviews, organisation reports) and quantitative (e.g. financial reports) data.

UK Energy Research Centre

This project was undertaken as part of the UKERC programme, funded by the Research Councils Energy programme. UKERC carries out world-class interdisciplinary research into sustainable future energy systems. It is a focal point of UK energy research and a gateway between the UK and the international energy research communities. Our whole-systems research informs UK policy development and research strategy.

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Gwent Energy CIC key facts

Year established	2009
Location	Chepstow, Wales
Legal structure	Community Interest Company (CIC)
Annual turnover	Approx. £100,000 (2018) including: • £37,000 Feed-in-Tariff (FiT) • £3,000 Renewable Heat Incentive (RHI) • £60,000 installation services
Net surplus	£5,000–10,000 spend on various community benefit activities
Total assets	£188,000 (tangible fixed assets 2017)
Generation capacity	• 160 kW Solar PV, generating approximately 150 MWh per year • 100 kW wood pellet biomass boiler generating approximately 60 MWh per year • 17 EV charging points with a capacity of 146 kWh
Finance	Combination of bonds and loan contracts with community members
Subsidies	Some grants. Long-term revenue payments (e.g. FiT and RHI)
Number of FTE staff	3 full-time staff from 2019
Number of regular volunteers	One key worker – the CIC's director – who works full time and several part-time contributors, including advisors called trustees
Number of members	Gwent Energy is a CIC and has no members: it has 40 investors in an Investor Club
Key partnerships	Transition Chepstow, community groups, local government, local private businesses

(Source: interviews and company accounts)

Summary of key lessons

- **The withdrawal of the FiT has made business model innovation necessary, whilst legacy revenues from the FiT have made experimentation possible.** The withdrawal of the FiT has meant that the CIC is unable to employ its existing revenue model for future projects, forcing it towards a more service-oriented approach. Interestingly, the 20-25 year long guaranteed revenue the FiT provides has also provided the CiC with the necessary capital and security for them to experiment with their business model.
- **Community loans and bonds can be a viable alternative to community shares for delivering community energy projects.** Instead of crowd-sourcing share finance from hundreds of shareholders, Gwent Energy has shown how raising community loans and bonds through a members-only Investor Club presents a different means of raising capital.
- **Challenges of CIC legal structure have been overcome by an innovative finance model and a cooperative ethos.** Whilst it has some advantages, the CIC legal structure suffers from the inability to raise community shares and the lack of an automatic democratic "one shareholder, one vote" system. These shortcomings have been overcome by legally incorporating these voting rights and raising finance through loans and bonds from community members only. In turn, these investors are invited to sit on committees to shape the CIC's future.
- **Heating business models present key challenges for community groups.** Gwent Energy have thus far been unable to expand the heating side of its business, because of a combination of the poor rate of return from some low-carbon heating technologies (e.g. heat pumps), the rising cost of feedstock (e.g. biomass) and the difficulty of getting users to sign up for district heating.
- **High dependency on individuals with appropriate levels of time, skill and commitment to generate social and environmental benefits.** The establishment of the CIC would not have been possible without the involvement of one key individual. However, steps are being taken to overcome the dependency on the company's chief architect.

1 Mission statement and value proposition

Gwent Energy's value proposition is centred around community, environmental benefit and cost savings. It aims to help local consumers save money on their energy bills through a combination of renewable energy, efficiency, storage and electric vehicle (EV) charging interventions, whilst simultaneously generating a surplus that is re-distributed to support local community initiatives (Gwent Energy CIC, 2019a).

Gwent Energy looks to help local organisations, companies and residents deliver energy system improvements that may otherwise not have taken place. In particular, it has been able to carve out a niche customer base, as an energy service provider to local community groups, especially those whose properties would benefit from energy improvements but whose leadership lacks the capacity to deliver energy projects:

"Many community organisations that delivered vital community services, could benefit from renewables but did not have the skills needed. Gwent Energy's mission was born" (Gwent Energy CIC, no date)

Gwent Energy has delivered energy systems to various community organisations (e.g. churches, community centres, schools, and lifeboat stations), small and medium-sized enterprises (SMEs) (e.g. farms, bed and breakfasts) and local residents. Individually, these are typically fairly small-scale systems, such as solar PV of around 10 kW (see Section 4.2). However, the collective impact of these installations is considerable. Gwent Energy currently owns 260 kW of energy assets – one 100 kW biomass boiler and 160 kW of solar PV – which are installed on community buildings (see Section 4.4).

Gwent Energy goes beyond straightforward generation to provide various energy services, including generation system monitoring, onsite fault-checking and extended warranty services. In other words, it offers operations and management contracts. This is alongside installation of energy storage and EV charging points, as well as provision of advice and interventions to reduce energy consumption.

2 Origins and development

Gwent Energy's origins are closely tied to Transition Chepstow. Transition Chepstow is part of the Transition Movement, the environmental movement which was founded in Totnes in the UK in 2006. The Transition Movement seeks to address climate change through grassroots community-driven innovation (Feola & Nunes, 2014). Transition Chepstow came into being in 2007 and was officially constituted in 2010 (Transition Chepstow, 2010). It is part of the Transition Network, a network of communities across 50 countries which share ideas on how to realise the aims of the Transition Movement (Transition Network, 2016).

Table 1 – Gwent Energy CIC: key dates

2007	Transition Chepstow founded.
2009	Gwent Energy CIC formed to raise funds for sea wall maintenance from wind turbine.
2010	Gwent Energy begins assisting community groups with energy installations.
2015	Gwent Energy moves into EV charging points and energy storage.
2017	Gwent Energy benefits from a £24,000 grant from the EU, Welsh Government and Monmouthshire County Council to increase number of EV charging points in local area.

Gwent Energy's direction was influenced by its participation in the Transition Network. The key agent of Gwent Energy, who would go on to become the company's director, was one of the early founding members of Transition Chepstow. He was heavily involved in the establishment of the organisation's energy group (I16). The energy group was "the start point" for a social enterprise because, through its early work, the group became aware that "there was a lot of interest in domestic installation" so it might "make a little bit of money" which could be spent on community benefit (I16).

In 2009, when Transition Chepstow was in its infancy, Caldicot Town Council, representing the coastal town neighbouring Chepstow, contacted the energy group about the prospect of building three large community-owned wind turbines (Gwent Energy CIC, 2019c). Gwent is a low-lying area near the coast, which is at risk of climate change-induced coastal flooding. Gwent Energy's director explained that Caldicot Town Council "came to us because they thought we could do things with renewable energy" (I15). This project would be the founding initiative of Gwent Energy.

Gwent Energy was to be the vehicle through which funds could be raised to deliver the project, via a share offer (Companies House, 2009). It was to be the means through which the revenue from the wind turbines, projected at £1m per year (Gwent Energy CIC, 2019c), would be redirected for the improvement and maintenance of an existing seawall. Any revenue over and above what was needed for the seawall, the director hoped, could "provide some funds for community needs such as wildlife projects and village halls" (I15). However, the wind turbine project was abandoned by Gwent Energy due to local opposition.

During this initial period of activity, Gwent Energy had also been involved with the delivery of energy advice to local community organisations.

In the wake of the failure of the wind project, the company's key figures concluded that smaller scale projects, where energy installations could be installed on local buildings, were a more viable option. Furthermore, the growing links to community organisations opened up possibilities of partnership working.

Deriving income from the installation, ownership and maintenance of solar panels for local community groups became CIC's core business. This model involved the creation of mechanisms to source finance from the groups to allow Gwent Energy to deliver the projects (see Section 4.5.4). At the same time, the CIC also explored ownership of solar farms.

Gwent Energy's leadership believes that these plans were undermined following the election of the Conservative government in May 2015. What followed soon after were cuts to the FiT, a long-term revenue-based subsidy for small-scale renewable power generation. The director told Solar Power Portal in August 2015 that these reductions meant that his community-based business model was "now dead" because the "proposed tariffs will barely cover the administration costs alone" (Gwent Energy Director in Bennett, 2015:). The cuts also led to reduced demand for Gwent Energy's private solar installations because "households are just not installing solar at the rate they used to" (I16).

Gwent Energy's director was also concerned about the cut in tax relief for green energy projects (see Gani, 2015) because "that took away an incentive for people to invest in the community schemes" (I15). More generally, the rapid change in the policy landscape threatened to destabilise Gwent Energy:

"We've found almost every couple of weeks there'd be a new measure that would come out which was making things more difficult … for about 18 months it was really disheartening because we just couldn't seem to do anything without it getting scrapped" (I15).

The changing policy environment drove the organisation to experiment with business models associated with other technologies: "We couldn't see a way of funding [our projects] anymore, [so] we looked at other options" (I15). To try to make energy installations viable in the long term, Gwent Energy started installing battery storage alongside solar PV and installing EV charging facilities in preparation for "life after the feed-in-tariff" (Powell, 2019).

3 Legal structure

Prior to the formal incorporation of Gwent Energy in 2009, the leadership of the group recognised the need to adopt a legal structure to deliver energy projects more effectively:

"One of the reasons for setting up Gwent Energy was somewhere where we have a bank account and we'd have a properly constituted organisation" (I15).

The group was faced with the choice of which legal structure to adopt. A charity was considered "too limiting", and a purely commercial organisation was not favoured: "we wanted something which was more community minded" and that "might open up more grant and other opportunities for us" (I15).

The CIC leadership received some information from Monmouthshire Council about the variety of social enterprise structures available (I15). When it considered the options, the Community Interest Company structure appealed because: "It's there in the name that people could see that we were community minded" (I15) (see Appendix B for an outline of the key features of legal structures common in the community energy sector).

A key advantage associated with the CIC structure is that CICs are subject to only "light touch" regulation (Smith and Teasdale, 2012: 166); what this means is that, from an administrative perspective, they are easy to set up and run (I10; I11).

As one interviewee put it:

"When you file your accounts each year, you have to send in a couple of pages to the CIC regulator, who probably doesn't even read it, to say what you've been doing" (I10).

In contrast, the legal status of the other key community-focused social enterprise structure – the Community Benefit Society, or BenCom – had not yet been consolidated by the Community Benefit Societies Act 2014. Thus, incorporating Gwent Energy as a BenCom appeared to be a less accessible option in 2009; Gwent Energy's director even goes as far to state: "Bencoms weren't in existence when we set up" (I15)[1].

The group eventually opted to form a CIC limited by shares. A key driving force was the need to raise money for the proposed wind turbine project. In one respect, a CIC was a better vehicle for investment than a BenCom when Gwent Energy was incorporated, because there was a cap of £20,000 on how much an individual shareholder could invest in a BenCom at the time. There are no such restrictions in place for CICs.

The Community Benefit Societies Act 2014 consolidated cooperative law and raised the cap on the sum of share equity any individual investor could hold to £100,000 (Co-operatives UK, 2019). Nevertheless, there is no inclination in the Gwent Energy leadership to go through the regulatory hurdles and incur the cost of converting the enterprise from a CIC to a BenCom: "it's set up and it's running" says the CIC's director.

Indeed, the governance arrangements have been established in such a way to make Gwent Energy like a BenCom; rooted in a defined community and founded upon cooperative principles.

1 Community Benefit Societies were first established as legal structures in 2003, so did exist in 2009, but their status was clarified in the 2014 Act (Smith and Teasdale, 2012).

This is evident from the CIC's document of incorporation, which established the rules by which the organisation would be governed. For example, shares in Gwent Energy are only to be "issued to persons who live, work or undertake leisure activities in the flood plain community" (Companies House,2009: 12).

Moreover, a "shareholding of any number of shares gives the holder the right to one vote and only one vote at AGMs and other official meetings" (Companies House, 2009: n.p). The director explains the decision to establish the rules of governance in this way:

"We wanted people to have a say in it … I really didn't want to be in the position of people thinking I was in charge and making all the decisions. I wanted to be a bit more democratic" (I15).

These governance arrangements were modified, due to the changing business model of the CIC, but its cooperative and participatory ethos remains. As the wind project never came to fruition, large numbers of shares were not required to be issued to finance it; there are still only three shareholders, the same number as when the company was incorporated (Companies House, 2009). Instead of governance by shareholders, Gwent Energy's Investor Club model of finance (see Section 4.5.4) became an informal means of facilitating member participation.

Day-to-day management of the CIC is undertaken by the director, and the overall direction of the company is discussed and established in meetings of the three shareholders (which includes the director), the company secretary and five trustees. The trustees are drawn from the CIC's Investor Club, which comprises the approximately 40 investors in Gwent Energy's projects. All trustees/investors are asked if they wish to become advisors, and those who volunteer join the advisory group (I15).

4 Business model

4.1 Activities

Gwent Energy's central activity is the installation of energy systems. Its main focus has been on solar photovoltaic (PV), installing systems on over 32 community buildings, 276 homes and various local businesses. These total 160 kW of capacity and generate over 150 MWh per year (Gwent Energy CIC, 2017a). Gwent Energy have also installed and managed a 100 kW wood-pellet biomass boiler, 9 electric vehicle (EV) charging points (146 kW) and more than 100 kWh of battery storage for more than 20 homeowners and community groups (Gwent Energy CIC, 2019f. From 2017, the CIC has installed several EV charging points and related technologies in business and domestic properties (see Section 4.4).

In September 2018, the CIC's director reported that Gwent Energy was doing in total about two installations a month (I15). This work is typically subcontracted to self-employed engineers, with Gwent Energy acting as project manager, but is sometimes carried out by the director or staff of Gwent Energy (I15).

Gwent Energy also shares many of the characteristics of an Energy Service Company, which the EU defines as a company "that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing" (EU, 2006: 6), where its payment for these services is performance related. Energy services can be defined as "those functions performed using energy which are means to obtain or facilitate desired end services or states" (Fell, 2017: 129).

For instance, Gwent Energy operates a Care Club (Figure 2). For £50 per year, the CIC monitors the performance of systems to identify any sub-standard performance, before alerting customers and advising on how performance might be improved. This may involve Gwent Energy coming out to fix the issue free of charge. The CIC also submits any FiT readings and provides an extended warranty on the equipment it installs for Care Club members (Gwent Energy CIC, 2019a). Another related activity performed by the group is solar panel cleaning, which is offered for £250. Gwent Energy is also responsible for installing and maintaining electricity storage systems and EV charging

Figure 2: Gwent Energy Care Club service (Gwent Energy CIC, 2019a)

points, as well as provision of advice and interventions to reduce energy consumption. These are all services that provide local consumers with something beyond "bog-standard" electricity supply.

Installations on community buildings may also involve Gwent Energy in raising finance through loan or bond issues to users of the buildings and members of the local Transition Movement (see Section 4.3.1). Gwent Energy must then service this debt from its income and manage the repayments to lenders and bondholders. The company secretary manages a database and issues the payments (I15). Gwent Energy also disburses the surplus revenue generated to various local community groups and charities (see Section 4.5.3).

To raise its profile, Gwent Energy is involved in community engagement activities. The CIC holds meetings and information events and attends events organised by others. In total, it attended 43 such events in 2016/17 (Gwent Energy CIC, 2017b). The CIC also communicates with the public through social media and newsletters, and has a dedicated member of staff whose role it is to manage the website and social media of the CIC (see Section 4.4.2).

4.2 Customers

Gwent Energy serves a variety of customers, but community groups (e.g. churches, community centres, schools) can be considered to be their core customers. Gwent Energy provides free advice to such groups. When these groups use their own funds or grants for installations, Gwent Energy is paid for the installation only. However, where these groups call upon Gwent Energy to help fund the project, funds are raised through Gwent Energy's Investors Club.

In these cases, Gwent Energy owns the installation and receives payments from the associated FiT or RHI subsidy (Section 4.5.1). Examples of the kinds of community groups that have received services or assistance from Gwent Energy are listed in Table 2 and Figure 3.

Gwent Energy estimates that 19,000 people regularly use the community centres that benefit from owning their systems, and that Gwent Energy's interventions have generated annual savings of £21,000 on these groups' energy bills (Gwent Energy CIC, 2019c), money that can be spent by the community on other services.

Table 2 – Examples of Gwent Energy involvement in community projects

Date	Community Customer	Installation	Notes
2010	Pandy Hall	4 kW solar PV	Advice on installations only
2011	Ty Castle Community Solar Farm, installed on roof of a chicken farm	32 kW solar PV	Installed by Gwent Energy and funded by the Investor Club
2014	Wellington Baptist Church	100 kW wood-pellet biomass boiler	Grants and/or own funds
2015	Bridges Community Centre	15 kW solar PV	Installed by Gwent Energy and funded by the Investor Club
2015	Ebenezer Baptist Church	10 kW solar PV and LED lighting	Grants and/or own funds
2015	SARA Lifeboat Station	10 kW solar PV	Installed by Gwent Energy and funded by the Investor Club
2019	Taff Bargoed (Christian Charity) Bridges Community Centre	30 kW ground-mounted solar PV	Grants and/or own funds
2019	Ferryside Community Centre, Ebenezer Baptist Church	20 kW solar PV system and matching battery storage (in development)	Grants and/or own funds
2019	Knighton Community Centre, St Arvans Village Hall	21 kW solar PV	Grants and/or own funds

(Source: I15; Gwent Energy CIC, 2017a)

Figure 3: Mini case studies of Gwent Energy installations at community buildings (Source: Gwent Energy CIC, 2019e)

Ebenezer Church

This community church installed 10kW of solar, 10kWh battery storage and revitalised their lighting system with energy efficient LED lighting. This made a huge difference in their energy bill, allowing them to offer many community services.

Bridges Community Centre

This community centre in Monmouth holds our original 10kW community system. Now expanded to 15kW, their reduced bills mean they have more money for their other community projects – such as providing free local transport for some of the most vulnerable citizens in Monmouth.

Highfields Church

This large and active community church installed 24kW to cover the many different services they offer to low-income families in the local area.
We certainly had some gorgeous views on this four-storey high church!

Oakdale Community Centre

This community centre installed 4kW of high efficiency thin film, powering a well used safe and secure community centre and nursery in a low-income area.

SARA – Severn Area Rescue Association

This volunteer-run rescue association installed 4kW on their roof. Despite shading from the Severn Bridge, the optimisers on their system ensure every panel can work to its highest standard to recharge batteries for vital life-saving equipment.

Gwent Energy has also delivered similar solar PV systems to local residents and SMEs (e.g. farms, bed and breakfasts). Many of these have also benefitted from energy storage installations (Section 4.4).

Gwent Energy is now developing a new range of customers through its EV charging network. Customers are individual EV owners who pay to use Gwent Energy charging points. The charging points are sited in various locations owned by partners of Gwent Energy (see Section 4.5.1). Most of the charging points are not "rapid charge", and the focus instead has been on attracting customers who demand "destination charging". This is where they charge their vehicle whilst engaging in an activity for a few hours, such as afternoon shopping or eating out in town (ITV News, 2019).

Apart from word of mouth, Gwent Energy's marketing strategy hinges on raising its profile locally, and it organises numerous events (Figure 4), including a free tour of an Energy Recovery Facility and an EV opening day (Gwent Energy CIC, 2019h). An example helps to illustrate how successful these events have been at generating custom: Gwent Energy CIC and Transition Chepstow organised an event entitled "Does Battery Storage Work?" in June 2016. Speaking afterwards, the CIC's director speculated that "the day is likely to generate 6 orders for PV with batteries and 2 orders for batteries alone" (Clatworthy, 2016: 6).

Figure 4: Gwent Energy CIC's EV Open Day 2019 (Source: Gwent CIC 2019i)

4.3 Partners

Gwent Energy has benefitted from a number of partnerships, most notably with the Transition Movement (especially Transition Chepstow), local community groups, local government, sub-contractors and private businesses.

4.3.1 Transition Chepstow and the Transition Movement

As we have noted previously, the Transition Movement was an important factor in the establishment of Gwent Energy. While there is no formal link between Transition Chepstow and Gwent Energy, the ties between the organisations continue to be strong. Indeed, Gwent Energy has been described as being like a "sister organisation" to Transition Chepstow (I16). Gwent Energy, through its community benefit fund, prints leaflets for Transition Chepstow and has also sponsored events promoting the group's work in the community. The CIC's director regularly briefs Transition Chepstow's energy group on their activities.

In return, Transition Chepstow shares information and contacts with Gwent Energy; it is largely through these informal networks that good relations between Gwent Energy and the local municipal authorities have been established. Furthermore, key figures in Transition Chepstow provide advice to Gwent Energy as trustees. For example, a Gwent Energy CIC trustee and Transition Chepstow member assisted Gwent Energy in making the successful application to Monmouthshire County Council for the grant to fund the EV charging point programme (I16). In sum, Transition Chepstow was pivotal to the formation of Gwent Energy and, by providing links to the broader community, has created the conditions in which Gwent Energy has developed and grown.

4.3.2 Community groups

Gwent Energy's good relations with community groups have seen these groups host Gwent Energy-owned energy assets on their properties, providing much of the CIC's revenue (Section 4.5.1). Links with community groups have also provided Gwent Energy with sites for several of their EV charging points, whilst community centres have hosted Gwent Energy events to help raise the CIC's profile (Gwent Energy CIC, 2017b). Importantly, because of the Investor Club model for financing community installations, members of community groups form a significant part of the investor community from which the CIC's advisory group (its trustees) is formed (see Section 3). Since 2017, Gwent Energy CIC has also installed a number of EV charging points on, or in the grounds of, community buildings (Section 4.5.1).

4.3.3 Local government

Caldicot Town Council and Monmouthshire County Council both played a role in the early development of the CIC. Caldicot Town Council instigated the CIC's first major project, and Monmouthshire County Council advised Transition Chepstow, which provided information on the legal structures that a new energy-focused social enterprise might take. As a Gwent Energy trustee explained, from the outset: "we've been very closely engaged with and provided with support and encouragement from Monmouthshire County Council" (I16).

Transition Chepstow benefitted from the foregrounding of issues such as peak oil and climate change in Monmouthshire County Council's 2008/09 community action plan. Furthermore, "climate change is still very much part of Monmouthshire County Council's language and planning" (I16). This has resulted in the council's formation of the Climate Champions Group, a network of community groups and renewable energy companies that meets quarterly with Monmouthshire County Council to work on climate change and energy projects (MCCC, 2017). The director of Gwent Energy is a regular attendee at the meetings and is considered the "respected expert in his field in that group" (I16). So, when Monmouthshire County Council opened the bidding for the Fully Charged EV charging point project (see Section 4.5.1), Gwent Energy were aware of it from the outset. Monmouthshire County Council has also given Gwent Energy the right to install EV charging points at some of its public car parks (CEE, 2018).

4.3.4 Sub-contractors

Gwent Energy does not undertake all the installation and maintenance in-house. Because of his many years of experience as an electrical engineer, the CIC's director maintains good connections with local tradespeople, who regularly do work on behalf of Gwent Energy (I15). Approximately three tradespeople work two or three days a month on PV installation for Gwent Energy. The director acts as a project manager for this work, and, because of his experience of such work: "I can tell customers exactly how it's going to be done … and all the problems with it" (I15).

4.3.5 Technology suppliers

Gwent Energy has developed a good relationship with Midsummer Energy for the supply of technology (I15). Midsummer Energy is a "wholesaler and retailer of renewables systems and products" with offices in Cambridge and Dublin (Midsummer Energy, 2019). The CIC purchases all of its equipment from this supplier[2]. Because of the CIC's ongoing relationship with Midsummer Energy, Gwent Energy has trade credit with the supplier and is able to source technologies at a discounted price. Midsummer Energy is commended by the CIC's director for providing outstanding technical support.

4.4 Resources

4.4.1 Technological resources

Gwent Energy deploys technologies in three key areas:

a) solar PV, storage and related technologies

b) heating; and

c) EV charging.

Solar PV, storage and related technologies

As outlined in Section 4.2, Gwent Energy installs both solar PV and storage technologies. One such storage technology is Solar iBoosts. These monitor the electricity being generated by the user's solar PV system and compare it against the amount of electricity used. A "sender", which is clamped to the electricity meter, sends information to the Solar iBoost+ wirelessly. If the user generates 100 W more energy than they consume, the excess power is diverted to their immersion heater (Solar Guide, 2019).

The CIC also installs batteries, which remains the company's "most requested project" (I15). The CIC initially installed lead-acid batteries (Powell, 2019) (Figure 5). It was found, however, that these performed less well than lithium batteries. As the price for lithium batteries has decreased, the CIC now only installs these (see Section 4.5.1).

Figure 5 -First Gwent Energy Battery Installation 2015 (Gwent Energy CIC, 2019f)

The director says that "now we sell everything with storage" (I15). Selling storage together with PV makes sense, because the customers "can benefit a bit more from the power they are generating" (I16).

Gwent Energy is currently conducting trials on a domestic property where it has installed four second-hand lead-acid batteries and monitoring equipment, to explore the possibility of generating ongoing revenue from ownership of the storage and PV sites it installs in properties, as opposed to generating revenue from the battery installations alone (see Section 5).

Gwent Energy has also installed and owns one 100 kW wood-pellet biomass boiler in a community centre, which replaced the "very old oil boiler" in the property (Community Energy Hub, 2015) (Figure 6). The new boiler generates about 60,000 MWh per year (I15). This is roughly equivalent to about five average sized households' consumption of gas for heating (BEIS 2019).

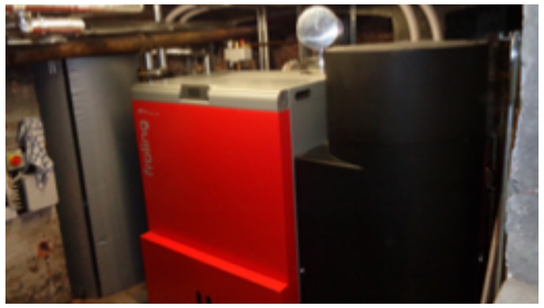


Figure 6 – Gwent Energy installed 100 kW biomass boiler at Wellington Baptist church and community centre (Gwent Energy CIC, 2019c)

Gwent Energy has opted for solar PV-powered solar iBoosts and biomass over other technologies. Both air-source and ground-source heat pumps were considered "a complete no go" for the CIC (I15), because the coefficient of performance promised rarely materialises, meaning they were often not economically viable (I15). They have also been involved in discussions about district heating, but these have proved challenging:

"If it's private housing, it's a bit problematic to get all of the people to agree to do it. And if it's like a housing association or council housing, they would do it themselves. They wouldn't involve us anyway" (I15).

Gwent Energy has also explored using a BlueGen combined-heat-and-power-system fuel cell boiler (see Section 4.5.1). These use gas and convert this through an electrochemical process into electricity and heat (GreenSpec, 2019). They convert gas to electricity at 60% efficiency (I15) and, for every kW of gas they use, they generate 0.6 kW of electricity (The Renewable Energy Hub, 2018). Moreover, when the thermal energy of the system is recovered, total efficiency increases by a further 25% to 85% (ibid). Such fuel cells make better use of natural gas, because they are more efficient than centralised gas-powered power stations, and, because the power is produced on site and need not be transported, inefficiencies associated with line losses on the distribution network are reduced (GreenSpec, 2019; I15). Fuel cell boilers produce heat but are used mainly for the production of electricity, which may or may not be used to produce heat in the property (I15).

EV charging and related technologies

Gwent Energy CIC has installed 40 EV charging points, ranging from slow chargers[3] of 3.6 kW to fast chargers of 20 kW (Gwent Energy CIC, 2019c). The deployment of EV charging equipment is an attempt to diversify and move away from electricity generation. The director came to the conclusion that electricity generation was no longer financially viable for community organisations; so "we then looked at the electric car charge points, because that looks to be where the future is going" (I15).

To generate revenue from EV charging successfully, the CIC had to consider innovative ways of capturing payment from customers for use of their EV charging points:

"We found some laundry equipment in Ohio … it's a card reader which will accept any debit or credit card contactless. Tap your card on and you get a certain charge. Now all the other card charge points, you have to belong to a network and have a car; a club membership that they charge you every month. But ours, anybody can use it any time, as long as they've got a contactless card." (I15)

Gwent Energy's tap and charge model has the advantage of not tying customers in to a monthly fee, providing the flexibility of a 'pay-as-you-go' model[4]. Gwent Energy's tap and charge solution is accessible to anyone with a bank card. This points to a potential market opportunity to challenge what the director describes as the "proprietary networks" of EV charging points (CEE, 2018: 2). He explains that EV owners suffer from not being able to access all available charging points. They can only access those associated with the particular memberships that they have:

"I've got a friend of mine in Carmarthen with an electric car. He went up to London at Christmas. He's got eight different network memberships and he failed to get a charge. He didn't have the right one. It's just archaic doing it that way" (I15).[5]

Gwent Energy also installs Myenergi Zappi intelligent chargers in domestic properties (MyEnergi, 2019), which are linked to solar panels (CEE, 2018). These work by charging the EV with electricity from the solar panels or grid when it is most economical to do so, such as when surplus power is being generated from PV panels or at night, when power is cheaper from the grid on time-of-use tariffs.

4.4.2 Human resources

Gwent Energy is "driven very heavily" by its key founder and director; he is the "dynamo" that drives the company forward (I16). He is a retired electrical engineer, with considerable experience in his field, which he gained working in the marine industry. He contributes over 50 hours per week to the company without taking a wage. He also undertakes installations, but will "call on and buy in resource to support projects as he sees it" (I16). In other words, he will employ sub-contractors to deliver some of the installations. Finally, he is responsible for the bulk of the sales the company makes: "there's no sales team to go out and win work; it's really what [he] can primarily bring in" (I16). The director also developed the Investor Club finance model deployed by the CIC (see Section 4.5.4).

Other volunteer labour includes three key trustees, i.e. members of the Investor Club, who volunteer to advise on the running of the company (see Section 3). This includes the secretary of the Investor Club. For "three or four hours a month … she checks the database" to see "who is due for a payment and then works out the payment and organises it" (I15). For this work she receives £300 per year. No dividends are paid, and there is no intention for these to be paid (Gwent Energy CIC, 2017b).

As of early 2019, there are three paid members of staff. Gwent Energy has hired an electrician, allowing the company to take more of the work in-house, as opposed to paying sub-contractors, helping to cut costs. This should cut down on the cost of installations work, which would previously have been sub-contracted. The CIC has also recently employed a full-time development manager to assist in developing the business, which should ease the burden on the CIC's director.

A third employee, who had previously volunteered with Gwent Energy, is the director's daughter. She manages the social media, website and the official administration of the company. The involvement of these two family members is an important part of the identity of Gwent Energy: the website homepage describes the CIC as a "family-run community interest company" (Gwent Energy CIC, 2017a). Gwent Energy has recently taken on an apprentice electrician to augment the team further.

2 Gwent Energy, however, planned to source its fuel cell boiler from the manufacturer, because this product is not sold by Midsummer Energy.

3 According to ZapMap (2019) "slow units (up to 3 kW) are best used for overnight charging and usually take between 6 and 12 hours for a pure-EV, or 2–4 hours for a PHEV". They are compatible with a 3-pin plug. Fast chargers (7 kW to 22 kW) typically charge an EV fully in three to four hours but require a special Type 1 or 2 connector to be installed. Rapid chargers, which are typically classified as 43 kW and above, are capable of charging an EV in an hour.

4 Currently in the UK, different "charging networks run different membership models … with some operating 'pay as you go' systems, some requiring significant subscription fees, and others offering free power and minimal sign-up fees" (Rosamond, 2019).

5 Auto Express magazine reported in May 2019 that in the UK: "each individual network requires an EV driver to register and carry a network-specific swipe card in order to use their charging points. The more networks you want to use, the more cards you'll have to carry" (Rosamond, 2019).

4.5 Finances

4.5.1 Income

Gwent Energy's director estimates that the company had a turnover of about £100,000 in the financial year ending March 2018 (I15), with around 40% of this derived from the FiT and RHI payment support mechanisms (see below). The remainder comes from the installation of energy systems in properties and from charges to EV owners who recharge their vehicles at Gwent Energy charging points. Some occasional income comes from grants. For example, a grant of £24,000 from the EU, Welsh Government and Monmouthshire County Council was used to develop EV charging points in Monmouthshire County. More detail on how income is generated is provided below.

Energy system installation services and generation

Energy system installation services and electricity generation have been at the core of Gwent Energy's business model since the failure of the wind turbine project. But the means by which it has derived income from services and generation have varied considerably. Gwent Energy has worked on about 80 different community projects, and has led the installation on about 32 of these. The director explains that:

"Almost every project we do has slightly different terms and conditions. Some of them we funded completely. [For others,] the organisation themselves have funded it … some of them they've been grant funded … some of them there's a mixture of funding … We do the installation at cost and keep the price down for them" (I15).

For most of the projects, Gwent Energy has acted chiefly as an installer of energy assets. In these cases, it receives payment for the installation alone. It also does installations on commercial and domestic properties "to earn us some money to help pay our expenses" (I15). The typical cost of these is about £5,900 for a 6 kW domestic PV system plus £3,000 for a 7 kW battery. These installations are "not big money earners … our basic philosophy is we charge cost of the materials and labour, and then 10 per cent for our overheads" (I15).

Interestingly, the CIC's director estimates that, because of rises in the price of electricity between August 2018 and August 2019[6], the payback for the installation of combined solar PV plus battery storage has shifted from about 12–13 years to about 7–8 years. Moreover, he states that, while in the past only properties which could provide surplus generation for three to four months a year might achieve the greatest economic benefit from battery installations, the price rises mean that batteries plus solar might be economical for far more, if not most, properties in the future. From 2018 to 2019, Gwent Energy has seen a significant increase in sales of installations. It is in this context that Gwent Energy took on three full-time salaried employees in early 2019 (see Section 4.4.2).

To illustrate the extent of the increase, the CIC's turnover for March 2019 was equal to its turnover for all of 2018. The CIC's director attributes this increase in business to rises in electricity prices.

In comparison, Gwent Energy earns approximately £37,000 annually from FiT payments, across approximately 20 projects for which the CIC owns and maintains the equipment: "a bit like a rent-a-roof system, but more customer friendly terms" (I15). This includes revenue derived from installations on the properties of community groups.

Importantly, Gwent Energy owns 30 kW of solar PV that it installed free on the roofs of individuals who undertake unpaid community work, such as a community ambulance driver and a community bus driver. This was considered a reward for the community work. The director explains: "we've done most of these in the early days of solar. Most of those are on quite a good tariff, so they're quite a good useful income for us. So it's been mutually beneficial" (I15), with the hosts of these panels receiving any power they generate free.

The terms and conditions which Gwent Energy has been able to offer to community groups have changed over time due to the reduction in FiT rates. Initially, the arrangement was that Gwent Energy would receive half of the revenue from the FiT, and the community group would benefit from the other half plus reduced electricity bills. This became unviable, however, as FiT rates began to decrease. Gwent Energy responded by changing the model, so that it received all of the FiT. However, as FiT rates dropped further, Gwent Energy could still not make the finances work, even taking all of the FiT:

"We have to be able to get a return of about 10% of the capital cost. [For] a 20 kW PV system … we can put them in for about £15,000 or so. So we have to be able to see an annual income of about £1,500. Then I can repay the loans on it you see, and it's a viable project. Below that we just can't do it" (I15).

More recently, Gwent Energy has considered an approach whereby the community group pay 50% of the installation and the CIC pay the remaining 50%. The community centre would, again, gain from the energy savings, and Gwent Energy would be able to pay off the cost of half of the installation with what remains of the FiT. Whilst there have not yet been any who have taken up this offer, some village hall committees have appeared warm to the idea. But, of course, such a model is now in jeopardy with the cancellation of the FiT and little clarity around the revenue its replacement – the Smart Export Guarantee (SEG) – will provide.[7]

Storage

With Gwent Energy's traditional "rent-a-roof" model unlikely to be viable for the foreseeable future with the closure of the FiT, it has instead looked to generate revenue via battery storage. At present, Gwent Energy earns revenue solely from installing battery storage alongside solar panels. It is, however, developing a business model around ownership of storage assets, which could effectively act as a replacement for FiTs (see Section 5).

Heat

Gwent Energy owns just one heating project, a 100 kW biomass boiler (Section 4.4). The revenue model is effectively the same as that for electricity generation, but is for heat. Gwent Energy paid for the equipment and the installation of the energy asset, but receives payment via the RHI, which is analogous to the FiT. In return, the community building uses less fuel, and utility bills are reduced, assuming the biomass running costs are lower than those of the oil-fired boiler. The RHI rate received for the boiler was 5.2p per kWh, i.e. the rate available in July 2015 when the boiler was installed (I15). Gwent Energy receives about £3,000 per annum in RHI for its biomass boiler.

In general, the frustrating experience in attempting to advance heating projects since the installation of its biomass boiler has resulted in scepticism amongst Gwent Energy's leadership about whether another biomass project might be viable. Gwent Energy has advised several community groups on such projects. But, apart from Gwent Energy's existing scheme, no community group has yet decided to go ahead with a project.

Based on feedback from community groups as to why they have decided not to pursue a biomass project, the CIC's director believes that the major stumbling block is concerns about whether projected cost savings will be realised. Part of the concern stems from recent rises in the cost of the pellets used in the boilers (see Orme, 2017); the director explained: "I think that people were just worried about what the price of fuel was going to be" (I15). As significantly, from the perspective of Gwent Energy, is damaging UK government policy.

Since its sole biomass project was finalised, in mid-2015, non-domestic RHI rates for biomass boilers have fallen considerably (see ICAX, 2019). Indeed, the project was driven to conclusion quickly in order to benefit from previously higher RHI rates (Community Energy Hub, 2015). For example, had the same biomass system been installed in 2019, it would capture a rate of 3.11p/kWh and generate roughly £1,900 per annum, about 35% lower than Gwent Energy receives for its 2015 installation. With falling RHI and the rising costs of fuel, biomass is: "not so attractive now at all" (I15). In this context, Gwent Energy's director is doubtful about whether another biomass heating project will emerge, largely because these changes in the market have undermined the "security of the investment" (I15).

As noted in Section 4.4, the perceived inability of heat pumps to provide cost savings and the challenges for a community energy company to orchestrate district heating projects have, effectively, ruled out these options for Gwent Energy.

Gwent Energy planned fuel cell boiler projects, which the CIC hoped to place in two community centres in 2019 (Gwent Energy CIC, 2019b). The boilers cost £20,000 each (I15) but offered potential cost savings, because they are very efficient and the large difference in average prices per kWh between gas and electricity bought from energy distribution networks.[8] The plan was for Gwent Energy to recoup the cost of purchasing and installing the boilers via income from the FiT, which the boilers generated.[9] Because of a delay in production by the manufacturer, the manufacturer could not guarantee their delivery before the closure of the FiT in March 2019. The projects, therefore, fell through (Gwent Energy CIC, 2019b).

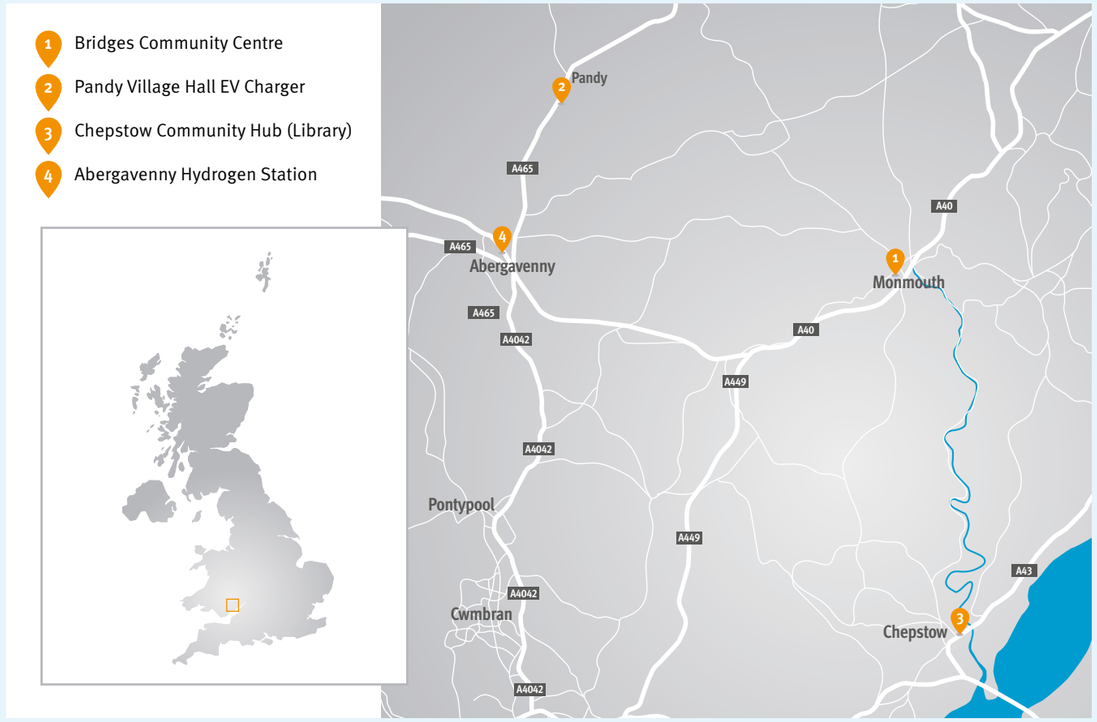
6 The details in this paragraph were provided by the director in August 2019 as feedback on an earlier draft of this case study.

7 The SEG will "ensure small-scale electricity generators installing solar, wind or other forms of renewable generation with a capacity up to 5 MW will be paid for each unit of electricity they sell to the grid – tracked by their smart meter". It will "place a legal obligation on energy suppliers with over 150,000 customers – covering more than 90% of the retail market – to introduce export tariffs by 1 January 2020". There will, however, "not be any specified minimum tariff rate" (BEIS, 2019), beyond it being above £0/kWh. The tariff will only be for export of surplus power.

8 Staffell (2009) explains there are two major cost advantages relating to micro-CHP fuel cell boilers versus traditional gas boilers: (1) "Electricity has 3.0-3.5 times the economic value of natural gas, so converting low cost gas into high value electricity allows households to reduce their energy bills"; and (2) "By capturing 'waste' heat, generating efficiency can rise from 30-50% in central power stations to 70-85%" (p.11).

9 As highly efficient micro generators, fuel cell boilers are entitled to FiT payments.

Figure 7 – The sites of Gwent Energy-owned EV charging points



EV charging

Gwent Energy has installed 40 EV charging points. Examples of locations where charging points have been installed include hotels, B&Bs, pubs, campsites, vineyards, garden centres, industrial parks, shops and community centres (Gwent Energy CIC, 2019g). They have also been installed in individuals' homes.

In total 20 EV charging points were installed as part of a project called Fully Charged. Gwent Energy won a grant worth £24,000 from the EU, Welsh Government and Monmouthshire County Council to conduct this work (BBC, 2017). The project allowed local businesses to trial a charging point for one year free of charge, after which time they could choose to have it removed or could purchase it at a discount (I15). As part of the scheme, businesses were not allowed to take payment from customers for charging their cars. Instead, businesses were expected to benefit from the additional custom. Gwent Energy did not receive any income from these charging points, other than what the CIC was paid for installing them.

Outside the Fully Charged project, Gwent Energy has installed 11 EV charging points, for two businesses and a number of individual domestic customers. Again, Gwent Energy does not receive any income from these charging points, other than the fee the CIC was paid for installation.

Gwent Energy also has nine installations at four sites outside the project which they own outright and which use a debit card payment system (Figure 7) (see Section 4.5.1).[10] With the card, users can charge their cars at 25p/kWh (I15).[11] Income from these sites was approximately £1,500 from August 2018 to August 2019. For the most part, Gwent Energy is able to keep the cost of sales down by sourcing electricity free for the charging, having to pay for electricity for only one of the car chargers. One of the sites is a library run by Monmouthshire County Council, which was happy to provide electricity for EV charging from its solar PV panels on the basis that Gwent Energy funded the installation. A similar arrangement is in place with community centres where EV chargers were installed.[12] This is the basis of a new business model which Gwent Energy hopes to expand in coming years (see Section 5).

10 They can also be used with a specific Gwent Energy payment card.
11 The director explained that, because credit or debit card payments take the payment in advance and for a period of time rather than a specific charge, and because customers sometimes interrupt charging early, in practice the amount per kWh may average about 30p.
12 Gwent Energy undertook one of these installations itself and advised on the other.

4.5.2 Expenditure

The director of Gwent Energy stated that the biggest costs for the company are labour and costs associated with installation, i.e. the purchase of equipment and sub-contracting. Between 2017 and 2018, he estimates that this totalled approximately £65,000 per year. As of August 2019, having taken on three full-time paid members of staff, the wages bill for Gwent energy is around £5,500 per month, or £66,000 per year.

Typically, Gwent Energy also has to pay about £10,000 interest per annum on the loans and bonds it has issued. Capital payments are a lot more variable from year to year, as bonds mature at different times. The director stated: "I've got somebody to pay back £7,000 next week. But next year I don't think there's anybody and then the following year we've probably got about £40,000 then to pay" (I15). Besides these costs, the largest items of expenditure include the events it holds and its community benefit activities (see Section 4.5.3).

4.5.3 Surplus and Community Benefit Fund

Between £5,000 and £10,000 is distributed out each year in community benefits. The fund is used primarily for stalls and marquees at county shows, each costing up to £1,000, which allows community organisations to showcase their activities. Organisations which have benefitted from Gwent Energy funds include Bee Friendly Monmouthshire, Gwent Wildlife Trust, Monmouthshire Meadows, Walkers are Welcome and the Gwent Association of Volunteer Organisations (Gwent Energy CIC, 2017b; I15). Gwent Energy has also provided some funds for Transition Chepstow projects, such as funding their marketing or small projects, such as planting apple trees in the town (I15).

4.5.4 Funding and finance

Gwent Energy had originally been envisaged as an investment vehicle, which would issue ordinary shares to finance a wind turbine project. In the end, because of the failure of the wind turbine project, there never was a public share offering, and the amount of equity investment raised by the CIC is minimal; the CIC has three shareholders, who have together invested only £5,000 in shares (Gwent Energy CIC, 2017b; I15).

In practice, Gwent Energy became an investment vehicle for community centres to invest in building improvements. The Investor Club model which developed consists of the issuing of loan contracts and bonds by Gwent Energy CIC to individuals associated with the properties on and in which Gwent Energy proposes to undertake installations.[13] The model was attuned to the particular circumstances of the projects which the CIC provided for its community partners.

Gwent Energy's director explains how the Investor Club model of investment was developed:

"One of the first projects which we were involved with … got some grant funding but it was enough only for 4 kW [of solar PV]. But they had a roof big enough for 10 kW … I said look, let's see if we can raise some more money to put 10 kW on while we've got the chance. So we decided to have a meeting of people that use the hall, and see if they would loan us some money … I spoke for about five minutes and it took us about 15 seconds to write down the names of people who were offering to lend us about £15,000 … That's the model we've used thereafter" (I15).

In this way, Gwent Energy raises the finance for projects from those most directly affected by them. To invest, investors must join Gwent Energy's Investor Club. Membership of the club entitles individuals to a number of benefits, including free membership of Gwent Energy's Care Club and an invitation to attend the CIC's annual Christmas dinner (see Section 4.1). It also qualifies members to volunteer to sit on both (1) the committee of trustees which oversees the investments in the CIC; and (2) the committee of both trustees and shareholders which oversees the business of the CIC (see Section 3).

Since the creation of its first loan, Gwent Energy has developed three financial products:

a) "A loan repaid in equal annual capital instalments over 10 years. And interest at 5% annually on the outstanding balance paid;

b) A bond with capital repaid at 20 years. And interest at 6% annually on the value of the investment;

c) A bond with capital repaid at a date chosen by the lender. And interest at 4% annually on the value of the investment" (Gwent Energy CIC, 2016: 2).

13 Loans and bonds are both forms of debt. Loans are paid back to the lender in (typically equal) instalments until the debt is paid. Bondholders receive only the interest payment each year until the agreed date when the bond matures, i.e. must be paid back to the lender.

The character of the financial products offered by the CIC is the result of demand from potential investors in the community. Loans were the initial financial product, because individuals, perhaps due to the novelty of this kind of investment, were reluctant to lend for more than 10 years and wished to have some of their capital returned each year. Later, bonds were developed because of requests from parents and grandparents for a vehicle to generate savings for their children and grandchildren "for university fees and stuff like that" (I15). The CIC's director explained that it "matched the feed-in-tariff period … they get interest going along and then they get their capital back at the end" (I15).

To be eligible for one of these products, investors have to be part of the Common Interest Group; membership of the Investor Club is open only to those who are described in law as forming part of a Common Interest Group. When a member of the Common Interest Group makes an investment, they then become a member of the Investor Club. Gwent Energy's Common Interest Group is defined thus:

a) "Members of a group such as: but not limited to a Transition Town organisation with a common interest of making their community more sustainable;

b) Members or supporters of the community organisation that benefits in some way from the renewable energy installation that it is proposed to be installed;

c) People who have addressed Gwent Energy C.I.C. during an organised talk or event on community energy" (Gwent Energy CIC, 2016: 1).

Membership of the Common Interest Group is an important feature in relation to Gwent Energy's financial products. Financial regulations stipulate that one cannot advertise an investment unless it is either approved by an authorised person or is exempt (UK Government, 2000). Issuing financial products only to members of a Common Interest Group provides the grounds for exemption and, therefore, saves Gwent Energy the legal fees associated with approval by legal professionals for each loan or bond issuance.[14, 15]

Gwent Energy ensures that investors have confidence in the investment, because it is the investors themselves who oversee their investment through the Investor Club. The Investor Club is run by the trustees, i.e. the investors (Gwent Energy CIC, 2016). Any member of the Investor Club can volunteer to become a trustee and oversee the investment portfolio (Renew Wales – Adfywio Cymru, 2019).

In sum, the Investor Club model fulfils two key roles. It allows investment to be sourced locally with a minimum of the expense associated with financial regulation; and it provides transparency, by creating an inclusive means through which investors oversee their investment.

There are four key reasons why sourcing investment by issuing loans and bonds has been chosen. Firstly, as is evident from the above, the Investor Club model developed by working closely in partnership with the community organisations and their members; Gwent Energy's financial products were tailored to investors' requirements.

Secondly, it allowed Gwent Energy to source cheaper community finance. Raising finance in the community is cheaper than sourcing loans from banks. Banks will not typically charge communities as low an interest rate as 6% (the highest rate offered by Gwent Energy) and may well charge far more (I2; S1).[16] This is evident in the case of Gwent Energy's biomass boiler installation; in order to deliver the project in time before a precipitous drop in RHI payments, a commercial bank loan was attained. This was a five-year loan from Henry Howard Finance at a 7% rate of interest per year. The director had to use his own house as collateral to secure the loan. While Gwent Energy has raised finance through its Investor Club to pay off as much of the loan as possible, it has not been able to fully refinance with its cheaper financing products (I15). Gwent Energy will pay approximately £1,000 per month until the loan is paid off in late 2019.

Thirdly, the major alternative to commercial loans – equity investment (or shares) – is challenging for a CIC to source for small-scale community projects.[17] As a CIC, Gwent Energy can only undertake an issue of ordinary shares, an expensive process to go through to raise capital from the public.[18] Thus, share offers are only viable for large-scale projects, where the projected returns on the investment are such that the high costs of undertaking the share offer are considered acceptable.[19] Reflecting on this challenge, one commentator states that CICs are "not designed to bring in small investors" (I8). Gwent Energy would need to convert to a BenCom or cooperative to issue community shares, the dominant form of community finance and a relatively inexpensive means to raise money.[20]

Fourthly, the CIC's leadership argues that the community loans and bonds model that Gwent Energy has developed is a fairer way to deal with investors. For this reason, converting to a BenCom or cooperative simply in order to issue community shares is not being considered by the management of the CIC. Gwent's director considers the community share offer to be potentially unjust, in that it gives too much power to the issuing association; with community shares, both the interest paid and the withdrawal of share capital are at the discretion of the board of directors (Community Shares Unit, 2019). Gwent Energy's director explains:

"With that loan agreement we're legally obliged to pay you. Whereas if it was a share issue … it's entirely down to the whim of the directors … In a way I think the share issues is not really the way you should treat community people that are supporting your project" (I15).

The CIC's director argues that the shares option offers insufficient security for investors not only because of the lack of legal obligations imposed upon a BenCom regarding payments to investors but because shares are not secured against the assets of the company (Gwent Energy CIC, 2015). In contrast, as lenders the CIC investors would have a claim on Gwent Energy's assets if the CIC was to become insolvent.[21] Shareholders are not secured and therefore have no such rights.

Two important points can be noted about Gwent Energy's innovative finance model. Firstly, the model is dependent on the availability of investment from individuals with higher-than-average disposable income. As of August 2018, Gwent Energy's director estimated that the CIC had issued about £170,000 of community debt. Since it has around 40 investors in its Investor Club, this amounts to an average investment of approximately £4,250 per investor. Nonetheless, this system can be seen to operate in a region with below-average disposable income. In 2016, Monmouthshire was ranked 270 out of 391 local authorities in the UK in terms of Gross Disposable Household Income per head, sitting 10% below the average (ONS, 2018). We can assume that such a model would function better in an area with higher disposable income.

Secondly, in the absence of the FiT, Gwent Energy's existing Investor Club finance model may face challenges going forward. Without the FiT, the revenue necessary to service the CIC's debt is not just less high but, crucially, less stable. This can be considered a significant issue with a finance model based on loans and bonds, because these financial instruments offer little flexibility to the company on the schedule or terms of repayment (Brewer, 2018). Notably, the CIC's most recent innovations have relied largely on grant funding or drawing on its own income. For example, outside of the Fully Charged grant, the installation of charging points has been funded through "surplus income from earlier solar systems", i.e. from the revenue Gwent Energy has generated from other work, for which it receives the FiT (CEE, 2018: 2).

14 For more information on the law on financial promotions, see Hunt and Fletcher (2016: 5), where it is noted that how "close" the connection between members of a common interest group must be is "not currently clearly defined" in law.
15 From January 2020 the promotion of "speculative mini-bonds" will be prohibited (FCA, 2019). While this appears to restrict the marketing of small-scale bonds through third party platforms, such as Abundance, this change is unlikely to affect Gwent Energy because the prohibition does not apply to organisations, such as Gwent Energy, raising "funds for their own activities".
16 Our project survey found that only very few bank loans provide an interest rate of less than 6%. In our case study on Green Energy Mull, the organisation sourced a loan of 5.25% from the Charity Bank. This loan, however was on a variable rate, so that it could become more expensive if circumstances change in the broader economy (Cairns, et al., 2020).
17 Shares raise investment when investors purchase a share which has been issued by a company.
18 Fees associated with a public share offer are in excess of £10,000. Thereafter, the considerable expenses involved with the share offer include independent auditing by accountants (I2; I8; I12; I21).
19 A share issuance may therefore have been viable for the larger wind turbine project that the CIC was established to deliver.
20 Community shares can only be issued by BenComs or cooperatives. Typically annual returns on investment are comparable to <6% which Gwent Energy pays on its debts. They do not have the same regulatory requirement as ordinary shares and a share offer is, therefore, cheaper (approx. £700) than for an ordinary share offer (I2; I8; I12; I21).
21 Despite the statutory asset lock in place for CICs, company assets can still be used as collateral for debt; the guidance notes from the CIC regulator explain: "If the venture fails and makes losses the CIC must still meet its contractual obligations in regard to the venture even if this means depleting its assets or selling some of them to meet its debts" (BEIS, 2016: 5).

5 Future development

The next step for Gwent Energy is to ensure that their business model continues to work in the future without the promise of the FiT. Gwent Energy is developing a business model based on battery storage plus solar PV. This possibility is explored in a document entitled Re-Storing our Power: Life after the FiT, produced by Gwent Energy:

"It is Gwent Energy's hope that they can provide the solar kit and batteries, but charge homeowners for the electricity used at half the rate they pay the big energy companies. This would replace the tariff and still provide savings"(Powell, 2019).[22]

One of the first domestic battery installations conducted by the CIC was hooked up to both solar PV and monitoring equipment and has been running as a trial for several years. Review of the data gives Gwent Energy insight into the viability of rolling out this model, the conclusion being that at this stage it is not practical, because of the high price of batteries. However, should battery costs continue to fall and/or electricity prices rise, then it could become viable:

"We've got to get the cost of the installation down probably another 30% before we can go [down] that route … But now electricity has started going up in price, [we] could well be able to make the model work" (I15).

While Gwent Energy's EV charging network is in its infancy, it has some promise. The income it derives from EV charging is hoped to deliver for the CIC "a 7-year payback before any return" (CEE, 2018: 2). So, while the income derived from EV charging points is currently small, it represents a potentially scalable revenue stream for the future. Looking forward, the CIC hopes to build partnerships to develop its charging network.

Discussions have been held with local councils and community groups about Gwent Energy financing the installation of solar PV on roofs or in car parks, sufficient to provide the energy for charging points linked to the panels. Gwent Energy would benefit from being able to expand its network without the ongoing costs of paying for electricity, and its partners would benefit from any free electricity generated that was not being consumed by EV charging.

One remaining issue, however, is that "a lot of people are used to this idea that they should have free charging. And that's not a very good business model for us" (I15).[23] Another is that it is possible that the CIC's business model may also become undermined by the growth in home-charging points and the increasing range of EVs, both of which would decrease the demand for re-charging on relatively short trips. Moreover, expansion of this model will depend on the availability of suitable sites for charging points to be established. The CIC's director learned from the roll-out of its charging network that "community centres were not a good place for a charger unless they were near a town, with comfort facilities nearby" (CEE, 2018: 2).

Despite some challenges, in some regards the position that Gwent Energy finds itself in is an enviable one. Its past work, in particular by riding the FiT boom, provides an income which will help sustain the company for several years to come. Moreover, its initial ten-year loans will begin to be paid off in the next three to four years, freeing up income for the CIC's future projects:

"We've got a couple of installations we've put in where we're actually paying more on the loans at the moment [than] what we're making on income. But another three, four years' time we'll have paid off those loans and then we'll get all the income going forward" (I15).

Perhaps the key challenge for Gwent Energy in the future is how to transition from dependency on the efforts of its founder and key member of staff. The fact that Gwent Energy is both technologically and financially innovative is the result of the rare combination of strengths of the company's key architect. It is unlikely that there are many professionals with decades of experience in the energy sector who are able or willing to devote full-time work free to such a venture. If it is to still exist in 20 years' time, the trustee suggests that Gwent energy CIC "will have a better understanding of how to maintain its survival by having … a clearer view on its structure and how to manage that structure" (I16).

22 The CIC plans to set up a meter for generation and a meter for usage to ensure the accuracy of their billing (I15).
23 *What Car?* magazine reports that "90% of Pod Point units offer free charging and owners of Tesla models registered before September 2018 get free unlimited use of its Supercharger network" (Evans, 2019). Note that, although businesses involved in the Fully Charged project were not allowed to charge for EV charging, individuals who charged their cars typically had to be paying customers of the business to access the charging points.

6 Key lessons

1. Withdrawal of the FiT has made business model innovation necessary, whilst the legacy of its long-term revenue made experimentation possible.

The introduction of the FiT spurred on Gwent Energy, facilitating its mission of expanding low-carbon electricity generation in its locality. The subsequent downgrading and then withdrawal of the FiT necessitated that Gwent Energy diversified its business model into new energy streams (e.g. heat, transport) with a stronger service orientation, in order to capture untapped revenue streams.

This has involved the implementation of solar PV-linked battery storage and the rolling out of a network of EV charge points. Today, Gwent Energy's business model is highly service oriented and is expected to become more so in the future. The two big barriers that remain are the relatively high cost of batteries and the low cost of electricity to consumers. The significance of the price of electricity is apparent in the case of Gwent Energy, as recent increases in prices have benefited the CIC by driving customers to install solar PV and storage.

Importantly, much of this diversification has been in part funded by Gwent Energy's income from the FiT. This calls into question the ability of newer entrants to the community energy sector to develop along the lines of Gwent Energy; new entrants to the community energy sector will be unable to rely on income derived from subsidies for support while they explore new options. The legacy of the FiT has enabled business-model experimentation, whilst its removal has essentially demanded it.

2. Heating business models present key challenges for community groups.

Gwent Energy's experience with business models based on heating technologies testifies to challenges for the community energy sector in operating in this space. For some technologies, such as biomass boilers, costs of fuel and the reduction of the RHI have discouraged Gwent Energy and its community partners from pursuing further projects. Other technologies, such as heat pumps, are not considered to provide sufficient cost savings to incentivise deployment, whilst district heating was considered too difficult, considering the challenges of coordinating potential local actors.

Most recently, plans to deploy fuel cells appear to have come to nothing because of logistical issues. Gwent Energy has, however, had success through installing Solar iBoosts to provide hot water during periods of excess solar PV generation. This intervention has, however, in the past been underpinned by the FiT, and, if solar PV is no longer viable without the FiT, then this intervention may no longer be viable either.

3. Community loans and bonds can be a viable alternative to community shares for delivering community energy projects.

Community financing proved an attractive route for Gwent Energy, because it was less expensive than commercially sourced capital. In contrast to many other community energy groups, Gwent Energy opted against raising share capital, in favour of loans and bonds via a local Investor Club. Gwent Energy was set on the path of a loan and bond finance by the earlier decision to incorporate as a CIC, a legal structure which is not designed for raising small-scale share finance. This self-imposed restriction, however, spurred the CIC on to co-create an innovative approach to community energy finance, in collaboration with members of community groups.

This was an approach that tailored a variety of financial products to the needs of community investors, including a legally binding commitment to pay supporters according to a defined schedule and interest rates. This model worked well under the FiT, which effectively underwrote the commitment to investors by providing a substantial and stable source of revenue. The cancellation of the FiT calls into question the viability of this model for the future, by increasing the investment risk.

4. Challenges of the CIC legal structure have been overcome by an innovative finance model and a cooperative ethos.

The CIC structure appears to have been chosen principally because the legal form demonstrates a community ethos, in comparison to other more conventional commercially focused companies. It was also because alternative cooperative legal forms were at the time so poorly defined that the option of the BenCom did not appear viable.

On the one hand, the story of Gwent Energy highlights the limitations of the CIC structure, by effectively disqualifying the company from considering share offers of a scale appropriate for its community projects. Furthermore, the CIC structure does not automatically stipulate a 'one member, one vote' democratic arrangement. On the other hand, it demonstrates the flexibility of the CIC model. Gwent Energy has incorporated a 'one member, one vote' rule and raised loans and bonds through a community-only Investor Club, where investors are encouraged to sit on committees that shape the direction of the organisation.

5. High dependency on individuals with the necessary time, skills and commitment to generate social and environmental benefit.

Gwent Energy's driving force is a committed environmental activist with a strong social conscience who is also a professional electrical engineer. It is unlikely that there are many individuals who combine this level of expertise, dedication to the cause and ability to work for over 50 hours a week without taking a salary.

The particular business model that Gwent Energy has developed, centred on energy installation services, therefore depends on factors which are extremely hard to replicate. Indeed, there is some concern about the future of Gwent Energy beyond the involvement of its chief architect and driving force.

Gwent Energy's extensive web of local relations and partnerships across the public, private and third sectors and its strong local reputation provide a good basis from which to meet the succession challenge. Moreover, the move in early 2019 to appoint a business development manager and electrician as full-time and salaried members of staff indicates that succession arrangements are being taken seriously at Gwent Energy.

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Appendix A – List of interviewees

Ref	Role	Organisation type	Date
I2	Manager	Devolved Government	Aug 2018
I8	Director	Social investment platform	Aug 2018
I10	Political advisor	Campaign organisation	Aug 2018
I11	Director	Private developer	Aug 2018
I12	Lawyer	Law firm	Aug 2018
I15	Director	Community Energy Organisation	Sep 2018
I16	Organiser	Community Activist	Sep 2018
I21	Director	Community Energy Group	Oct 2018

Appendix B – Key features of common legal structures

Legal structure	Governance	Limited liability	Fundraising	Asset lock	Charitable status	Notes
Community Benefit Society (BenCom)	One shareholder, one vote. Run for benefit of (defined) community.	Yes	Grants, community shares, loans, bonds.	Yes	Possible	Prioritises community benefit; typically lower returns on investment than co-ops.
Bona fide cooperative (Co-op)	One shareholder, one vote. Run for the benefit of members.	Yes	Community shares, loans, bonds. Excluded from some grants and loans, e.g. CARES grants and loans.	No	Difficult	More flexibility with returns to investors. Financial Conduct Authority places conditions upon grid export.
Community Interest Company (CIC)	Voting rights depend on whether CLG or CLS status. Run for defined social purpose.	Yes	Grants, ordinary shares (capped returns), loans, bonds.	Yes	No	Expensive to raise equity investment. Light touch regulation.
Company Limited by Guarantee (CLG)	Membership organisation with flexible structure. Often nominal (£1) membership fee. One member one vote common.	Yes	Grants, ordinary shares (capped returns), loans, bonds.	Possible	Possible	Different categories of members with different voting rights possible. No equity investment possible.
Charitable Incorporated Organisation/ Scottish CIO	Membership appoints board of trustees.	Yes	Grants, loans, bonds.	Yes	Yes	Strictly regulated. No equity investment possible.
Charitable Trust (unincorporated)	Board of trustees.	No	Grants, loans, bonds.	Yes	Yes	Strictly regulated. No equity investment possible.
Private Company Limited by Shares (CLS)	One share, one vote.	Yes	Grants, loans, (privately exchanged) ordinary shares, bonds.	No	No	Shares cannot be made available to the public.
Public Limited Company (PLC)	One share, one vote.	Yes	Grants, loans, publicly offered ordinary shares, bonds.	No	No	Structure familiar to institutional investors. Strictly regulated. Expensive to raise equity finance.