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The Heat Is On: The Capacities Required for the Establishment and Sustainability of Community-Owned Renewable Energy District Heating Systems in Ireland

Gerard Doyle
Technological University Dublin, gerard.doyle@tudublin.ie

UN Inter-Agency Task Force on Social and Solidarity Economy

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Gerard Doyle
Technological University Dublin
Ireland

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Abstract

International reviews of countries' progress at tackling climate change show that Ireland is making small levels of progress on tackling issues associated with climate change. This paper will examine a theoretical framework, referred to as capacity analysis, to explain the capacities that need to be in place for the successful implementation of community-owned renewable energy district heating initiatives. The theoretical framework employed here is based on the 'conceptual framework' developed by Pringle which consists of four categories of capacity. The research methodology involves a case study with cases from Austria, Northern Ireland, the Republic of Ireland, Wales and Scotland. The research indicates that the State needs to provide a range of supports for communities to establish community-owned renewable energy district heating initiatives. In addition, the State needs to implement a range of policies including the introduction of a carbon tax for the diffusion of these initiatives. The promoters of these initiatives need to be trusted within their respective communities. The research also points to the importance of engaging with a number of stakeholders. Dialogue with the residents living in the communities, where the community-owned renewable energy district heating initiatives are located, is also deemed a key factor for the establishment and maintenance of these initiatives.

Keywords

Biomass, Communities, District heating, Renewable energy

Bio

Gerard Doyle is currently completing a PhD on social enterprise and the transition to more sustainable local economies. His most recent publication is 'Socialising economic development in Ireland: Social enterprise an untapped resource' in Maher, C. (Ed.) Value Creation for Small and Micro Social Enterprises. Hershey, PA: IGI Global.

Introduction

International reviews of the progress of different countries in tackling climate change show that Ireland is making small levels of progress on addressing issues associated with climate change (Kirby and O'Mahony, 2018). The 2018 Climate Change Performance Index puts Ireland in 49th place out of 56 countries identified in the study (Burck, Marten, Bals, and Höhne, 2017). The report has highlighted Ireland as being the worst performing country in Europe for taking action to tackle climate change. The report forecasts that Ireland has little probability of attaining its 2020 emission targets – this will result in Ireland being compelled to pay penalties to the EU for failure to meet the targets.

Regarding energy security, Ireland had an import dependency of 85% in 2014, estimated to cost €5.7bn. In 2014, 97% of imports were fossil fuels (SEAI, 2017). Although Ireland has made modest progress in meeting its EU renewable electricity target, it has failed to increase the proportion of the heat energy from renewable sources. However, with the proper supports, communities have ample opportunities to generate heat from renewable energy resources in the form of biomass, geothermal and solar (Connolly et al. 2014). In doing so, it will contribute to the realisation of goal seven of the UN Sustainable Development Goals to ensure access to affordable, reliable and sustainable modern energy for all (UN, 2018).

Unlike Ireland, in several European countries there has been a significant increase in the number of community initiatives that are engaging in renewable energy production (Walker, 2008; and Bauwens, 2013). There is a wealth of literature focusing on the impact that these community initiatives are having, for example, in reducing energy consumption, augmenting community resilience and increasing awareness of environmental issues. However, compared to the level of research completed on the impact of community initiatives, there has been a dearth of research undertaken to determine the contributing factors that lead to communities successfully implementing community renewable energy initiatives (Middlemiss and Parrish, 2009).

This paper will examine a theoretical framework, referred to as capacity analysis, to explain the capacities that need to be in place for the successful implementation of community renewable energy district heating initiatives (also referred to as renewable energy district heating social enterprises). The first hypothesis being proposed is that communities require a range of capacities to be in place to establish community-owned renewable energy district heating initiatives. A second hypothesis is that the theoretical framework proposed by Pringle (2015) does not adequately explain the capacities required to establish community-owned renewable energy district heating initiatives.

District heating entails transferring thermal energy from a centralised source by a pipeline system to its end users (Gartland and Bruton, 2016). The heat used is metered at each building. District heating initiatives can come in different sizes.

- Communal heating systems heat single buildings with multiple users.
- Localised heating systems entail heating multiple buildings which are heated by a centralised heating system in a confined area or a campus.
- District heating systems provide heat to a neighbourhood or town.

The cases selected in this study are localised heating systems [1].

[1] The term district heating systems tends to be the term used. Hence, in order to avoid confusion, district heating system will be used throughout this paper.

Concepts

Community-owned renewable energy district heating systems are social enterprises. 'Social enterprise' is a contested term (Doyle and Lalor, 2012). To address the challenges in gaining consensus on a definition for social enterprise, a number of principles are detailed.

These principles, proposed by EMES[2], which distinguish social enterprises from investor-owned businesses, consist of four economic and five social criteria (Nyssens, 2006). The economic criteria are:

- Continuous activity in the form of production and/or sale of goods and services. Unlike traditional not-for-profit organisations, social enterprises do not normally undertake advocacy work; instead, they produce goods and services.
- A high level of autonomy: social enterprises are created voluntarily by groups of citizens and are governed by them. Public authorities or private companies have no direct or indirect control over them, even though grant funding may be provided by these organisations.
- A significant economic risk: the financial viability of social enterprises depends on the efforts of their members, who have the responsibility of ensuring financial resources are either secured or generated from trading activity, unlike the majority of public institutions.
- A minimum number of paid workers are required, although, like traditional non-profit organisations, social enterprises may combine financial and non-financial resources, voluntary and paid work.

The social criteria are:

- An explicit aim of community benefit: one of the principal aims of social enterprises is to serve the community or a specific group of people.
- Citizen initiative: social enterprises are the result of collective interaction involving people belonging to a community or to a group that shares a certain need or aim.
- Decision-making not based on capital ownership: this generally means the principle of 'one member, one vote', or at least a voting share not based on capital shares. Although capital owners in social enterprises can play an important role, there are other stakeholders who influence decision-making.
- Participatory character, involving those affected by the activity: the users of social enterprises' services are represented and participate in their structures. In many cases, one of the objectives is to strengthen democracy at local level through economic activity.
- Limited distribution of profit: social enterprises include organisations that totally prohibit profit distribution as well as organisations such as co-operatives, which may distribute only to a limited degree, thus avoiding profit maximising behaviour.

Thus, the EMES principles outline the essential characteristics of social enterprises. With regard to an actual definition of 'social enterprise', the one utilised in this paper is that set out by the EU:

*'*A social enterprise is an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in

[2] EMES is a research network of established university research centres and individuals whose goal so far has been to build up an international corpus of theoretical and empirical knowledge around 'social enterprise' concepts.

particular, involves employees, consumers and stakeholders affected by its commercial activities[3]'.

Regarding sustainability, the corporate sector's discourse on sustainability – which is measured in terms of profit maximisation, productivity and competitiveness – has a significant influence on how the sustainability of social enterprises is framed (Nyssens, 2006). This discourse on sustainability does not fit well with the diversity of social enterprises in Ireland, many of which could never attain financial sustainability (Crossan and Van Til, 2008). Indeed, it is the view of Quarter et al. (2014) that the majority of social enterprises will never attain financial sustainability due to their combination of activities and because of their location in disadvantaged communities.

Moreover, social enterprises' sustainability is not to be defined and measured solely in financial terms. Instead, it should be considered in terms of the extent to which a social enterprise achieves a combination of social, financial and environmental sustainability. These different forms of sustainability may be defined as follows: social sustainability is the extent to which a social enterprise realises its social mission; financial sustainability is the extent to which a social enterprise can meet its operational costs from a combination of, grants, traded income, and input from volunteers; and environmental sustainability is the extent to which the social enterprise's activities can continue without having a negative impact on the physical environment (Doyle, 2019).

Literature review

Theoretical framework

The theoretical framework employed is based on the 'conceptual framework' developed by Pringle (2015), which consists of four categories of capacity.

Individual capacity is defined as the level of skills, values and finance that individuals within a community possess which can assist in the formation of community-owned renewable energy initiatives. Middlemiss and Parrish (2009) assert that the social context of an individual shapes their capacity to initiate community renewable energy schemes. Indeed, Robbins & Rowe (2002) hold that the capacity for individuals to act is linked to the resource availability within a community.

The structural capacity of a community is concerned with the culture and values pertaining to organisations both within and outside a community which have an influence on, or could be influenced by, other organisations within the community. Pringle (2015) includes politicians in this category. The presence of community organisations and supportive state and local development institutions can contribute to a range of barriers being overcome (Pringle, 2015).

Infrastructural capacities refer to the stock of infrastructure that is present in communities which are conducive to the drive to promote sustainability.

Finally, cultural capacity refers to the level of commitment and openness to sustainability that exists within a community. The cultural capacity is influenced by the level of commitment to the values associated within the community, and the historical attitude, towards sustainability. A high level of trust of community projects and state institutions within communities contributes to them becoming more receptive to the development of community renewable energy initiatives (Walker et al. 2010). Middlemiss and Parrish (2009) assert that the above four capacities are interlinked and have an impact on one another.

In relation to the successful deployment of renewable energy heating initiatives, the State performs a central role through legislation and funding to facilitate the transition from heat

[3] https://ec.europa.eu/growth/sectors/social-economy/enterprises_nl

generated by fossil fuels (Parajuli, 2012). Research from Denmark demonstrates the interdependence of the national and local governments in the transformation to renewable energy district heating initiatives (Sperling, Hveplund, and Vaad Mathiesen, 2011). Central government passed legislation requiring municipalities to develop heat plans which require them to shift to the production of heat from renewable heat via a range of technologies including district heating initiatives (Mathiesen et al. 2011). The establishment of support bodies at national and regional levels contribute to promoters having access to the technical expertise and capacity to effectively engage with a range of stakeholders (Rakos, 2001). The provision of a range financial supports is also deemed critical to the establishment and diffusion of community district heating initiatives (Maldener, 2007). The engagement of Energy Service Companies can minimise financial risk to the consumers of these initiatives (Chittum and Ostergaard, 2014).

In relation to the development of district heating initiatives in the United States of America, the presence of 'champions' is identified as being key to their implementation. However, organisations are required to initiate and develop them (Burch, 2010). In Austria, well respected residents of villages and the presence of accessible support agencies are important actors in the diffusion of district heating initiatives (Maldener, 2007). Two additional sets of actors are – regional politicians for defending grant funding for district heating initiatives and scientists in promoting state-of-the-art technology. The grants on offer to farmers to produce biomass fostered new forms of cooperation between farmers and residents of villages to develop district heating initiatives (Rakos, 2001).

In Denmark, resources are allocated to the assessment of costs of district heating initiatives at national and local levels for different stakeholders. According to Chittum and Ostergaard (2014), the findings of these assessments give confidence to district heating initiatives. The same authors observe that a willingness to participate in renewable energy district heating co-operatives, a form of social enterprise, is underpinned by a belief in co-operation and mutuality They also emphasise how Danish legislation stipulates that municipalities co-ordinate the planning and implementation of district heating initiatives (Chittum and Ostergaard, 2014).

Community engagement

Rakos (2001) attributes the successful introduction of biomass district heating initiatives in Austria to engagement with communities in which the systems are proposed to be based. This engagement process enables local concerns to be addressed and is crucial in getting sufficient customers. Community support has played an important role in driving the uptake of biomass district heating initiatives. It can also contribute to community cohesion (Rakos, 2001).

Benefits to households

Chittum and Ostergaard (2014) highlight how Danish district heating initiatives that are mutually owned by the customers can lower the cost of supplying heat to households. These authors note that the risk of households linked to a district heating initiative being charged excessive prices for their heat is minimised when the customers are empowered to form a consumer co-operative, and they demonstrate that district heating initiatives minimise the risk of households experiencing breakdown in their heating (Chittum and Ostergaard, 2014).

Economic benefits

The economic benefits to local economies generated by community-based renewable energy social enterprises tend to be greater than those generated by investor-owned renewable energy entities (Tahram, 2015). This is chiefly because members/shareholders of renewable energy co-operatives are able to gain a financial return on their investment, if the electricity generated is sold into the electricity grid or heat is sold to a customer. In addition, research undertaken in Germany and Sweden indicates that local farmers gained an income from the supply of biomass to community-based renewable energy social enterprises (Tarham, 2015).

Lantz (2008) concludes/shows that the level of income yielded by renewable energy initiatives which remains in the host community is up to five times higher for social enterprises than for out-

of-state investor-owned businesses. Regarding employment creation, Lantz (2008) estimates that the employment during operation created by renewable energy social enterprises is 1.1 to 2.8 times higher than that created by investor-owned businesses.

Societal benefits

The development of renewable energy social enterprises can contribute to influencing citizens' attitudes and behaviour towards sustainability, which can result in additional social enterprises being developed (Walker *et al*. 2010). Community renewable energy social enterprises can enable people to become 'energy citizens' instead of being passive consumers of energy supplied by large-scale utilities (Chittum and Ostergaard, 2014).

Toke (2005) describes social networks arising from interactions between residents and community organisations and resulting in higher levels of social acceptance of renewable energy projects because of trust in the organisations promoting them.

Methodology

Cases were selected from several juridictions The rationale for selecting Northern Ireland, Scotland and Wales is that, similar to Ireland, there are only a small number of community - owned renewable energy district heating initiatives in each country. Unlike the Nordic countries, where they tend to be located in urban settings, the majority are located in rural communities. Austria was selected due to it having over 2,000 community-owned renewable energy district heating initiatives, of varying sizes, located in rural villages and towns. Therefore, as a result of selecting Austria, information could be gleaned on effective policies and supports for the development and diffusion of community-owned renewable energy district heating initiatives in Ireland.

The cases selected from each country are detailed below.

- Three Camphill Communities based in counties Kilkenny and Tipperary
- The Cloughjordan Ecovillage located in Tipperary
- Two Camphill communities located in counties Down and Tyrone
- A housing association in based in Argyll, Scotland
- The National Trust in Wales.
- An Austrian renewable energy co-operative.

Eighteen semi-structured interviews were held with:

- key individuals who are associated with the above community-owned renewable energy district heating systems,
- individuals who worked with support agencies from each of the selected countries
- and policy makers from all of the countries with the exception of Austria.

A list of trigger questions was used to guide the interviews, and some additional questions were posed, depending on each interviewee's responses. All interviews were audio-recorded and transcribed verbatim.

Qualitative thematic analysis was employed to formulate themes from the transcripts (Braun and Clarke, 2006). The process entailed reading each of the transcriptions a number of times in order to become familiar with the data. The text of each of the transcriptions was then coded. The codes and associated data are categorised under the relevant themes.

Findings

The research findings pertain to interviews with individuals associated with community-owned renewable energy district heating initiatives support agencies and policy makers. A number of themes are employed to categorise the research findings. The themes are: credibility and trust; dialogue; collaboration; supports; expertise; sustainability; stakeholder engagement; policy and regulations; and benefits.

In addition to the above themes, interviewees cite a range of motives for the establishment of these initiatives. Environmental reasons are the most common motive among interviewees for their establishments.

> *'you know, we are interested in the environment, we want to do the right thing, that's always been part of our agenda in our communities'.*

Other motives interviewees cite are: providing an income for local farmers; generating employment and strengthening fuel security.

The interviewees in each of the countries acknowledge various supports are required to establish and maintain these initiatives. The Austrian interviewees speak of how the capital that can be acquired from statutory grants facilitates the establishment of the initiatives. Initially, the State provided grants of 50% of the capital costs of the initiatives. This percentage was reduced to 30% as the number of initiatives established increased. The Irish interviewees, on both sides of the Border, mention how grant funding can be secured from the Leader programme and European programmes. In Scotland and Wales, a number of the interviewees are employed by a housing association and a national voluntary organisation. With the regard to the former, the interviewee states how housing associations can include the capital costs associated with these initiatives in the overall funding required to construct social housing schemes. With regard to the latter, the interviewee from Wales states that the capital costs can be covered from the organisation's reserves. A number of the Irish interviewees emphasise how important it is to gain funding to complete a feasibility study. In Ireland, according to four interviewees, the lack of a state grant system compels community organisations to spend time sourcing funding from several sources. Consequently, the interviewees acknowledge that this is a barrier to establishing these initiatives.

The findings indicate that there are different types of supports in place in the various jurisdictions. In Austria, all of the interviewees emphasise the pivotal role that support agencies play in the successful establishment of these initiatives. The interviewees distinguish between the technical support provided by one set of support agencies.

> *'Now in Austria we have about 25 certified quality managers that are participating in the system. Normally they are technical experts, they are engineers and they supervise the design and operation process of the plants'.*

> *'They kind of lead the promoters through the project by giving them advice on what steps to take and how to apply for the subsidies. They help them in setting up an economic analysis of the project and stuff like that'.*

Another type of support agency provides stakeholder engagement expertise to enable community organisations to both navigate the State apparatus and engage with residents.

> *'keeping the project out of the sphere of politics is also an important support'.*

In Ireland, according to three interviewees, there is a paucity of support available to community organisations committed to establishing renewable energy district heating systems. The same interviewees mention how there are only two dedicated support agencies providing support to communities interested in establishing these initiatives. A number of Irish interviewees comment how the insufficient number of support agencies in Ireland presents a barrier to the establishment of these initiatives.

> *'I was, ok I'm a practical person I can fix a tractor, there is no engineer from Austria on site and there was no support infrastructure, there was no dealership, there was nothing'.*

According to interviewees in Ireland, Northern Ireland and Austria, the promoters of these initiatives need to have credibility and be trusted among residents in their respective communities. Several Austrian and Irish interviewees comment on how allocating time and resources to increasing awareness of the initiatives can contribute to strengthening trust towards the founders' efforts.

> *'We gained the residents' trust by having lots and lots of conversations and meetings and giving them the facts, and at the end of the day it does help if you have a very sound economic argument'.*

The research indicates that expertise is derived from either within the organisation establishing the initiative or from external agencies. With exception of the majority of initiatives in Ireland and Wales, the interviewees mention how the expertise tends to be sourced from a range of support agencies. In Ireland, some of the founders state how they possess technical knowledge of how district heating systems operate from having either a mechanical or engineering professional background. Interviewees articulate how they augment their knowledge through operating these systems.

> *'I basically ended up doing it myself. You learned, you installed the whole project and managed the whole process. I engaged a welder to weld pipes properly and everything else we did ourselves bar the insulation of the pipes'.*

With the exception of one initiative, individuals originally from Austria and Germany performed a pivotal role in sourcing information and in some instances, in providing leadership to the establishment of initiatives. Furthermore, interviewees point to how having these individuals allows information to be more easily obtained than if it is individuals without a fluency in German who are endeavouring to obtain the information.

The overwhelming majority of interviewees comment on how the lack of expertise required to establish these initiatives can result in a range of technical difficulties being encountered. Some of these difficulties may ultimately require the boiler and the network of pipes having to be replaced.

> *'One mistake we made was not to treat the water and so it was eaten partly by limescale'.*

Three Austrian interviewees emphasise how the engineers employed in the support agencies ensure that there are no fundamental technical flaws in the design of the initiatives.

Interviewees indicate the importance of community organisations (that intend to establish these initiatives) either possessing or having access to expertise in: drafting grant applications; securing finance from a range of sources; financial management; community engagement; conflict resolution and understanding the planning process

Effective dialogue with a range of stakeholders is rated as being a key factor in the establishment and maintenance of these initiatives. Several Irish interviewees note the relevance of dialogue to address residents' fears and dissension against the establishment of the initiatives. Two interviewees point to dialogue with residents being effective when it focuses on the economic benefits associated with the systems over conventional fossil-fuelled heating systems.

> *'I think what made it happen in most cases was the economic argument'.*

How dialogue with residents is conducted can have an impact on the outcomes. One interviewee points to the effectiveness of addressing issues by discussing residents' concerns in small groups prior to convening public community meetings.

> *'If you were in a one-to-one, like if I could have met these dissenting voice people on a one-to-one, I don't think I would have a big problem to convince them that the project was actually quite good. If I was to do it again I would have approached it on a smaller scale first and gradually build it up to the public meeting event then, you know, the public meeting is more about endorsing what has already been felt in the village'.*

Three Irish interviewees are of the opinion that the willingness of households to engage in these initiatives is influenced by cultural factors. Two interviewees observe that Irish society does not

have a value system that prioritises equality, or social solidarity. They assert that this contributes to Irish communities being less receptive to the formation of these initiatives.

> *'It seems to be in the Irish psyche about, "I'll mind mine and you mind yours and I don't know about sharing it because it could get stolen on me or could, the whole thing could just go belly-up and I'll lose it all". It is a deep-rooted consequence of English oppression'.*

Several interviewees from Ireland emphasise the need for managers of these initiatives to have the capacity to effectively manage stakeholder relationships.

Interviewees detail two approaches to initiatives attaining sustainability. One approach entails the promoters of the initiatives recruiting volunteers with the necessary commitment to the development of renewable energy and varying levels of knowledge of biomass heating systems. According to interviewees, the vast majority of the volunteers are originally from either Austria or Germany. Their ability to speak German and to read German literature pertaining to biomass district heating technology enables communication and negotiations to take place regarding the purchase of the boiler and the installation of the system.

> *'I did grow up in Germany so I knew I had a slight advantage in the terms that I could speak the lingo, read the literature and I knew a lot of technology'.*

Furthermore, the same interviewees comment on how the installation of the biomass heating system is less expensive if undertaken by engaging local labour rather than via a specialist energy company. The other approach which is pursued in Austria, Scotland and Wales entails engaging a specialist installation company. The interviewees outline a number of risks associated with this approach. Firstly, the smaller-sized initiatives can attract installation companies that do not have the same level of expertise as larger companies. Secondly, a number of the smaller-sized installation companies can be more at risk of going into liquidation.[4]

> *'The company went bust hence we never got the solar farm aspect running; they left us with a half-installed system. We had to basically do a lot of retrofitting of the boiler house, the wiring was done very badly because it wasn't completed and then as the solar panels never worked and we had no comeback because the company just went out of business'.*

One organisation in Wales has sufficient reserves to enable it to hire a team of specialists, including engineers, to develop their own initiatives. Indeed, it can cover the costs of the debt repayment from the renewable heat incentive payments.

In relation to the operational phase, a number of Irish and Welsh interviewees comment on how the financial sustainability of the initiative can be enhanced through the:

- Generation of electricity which can be sold to their customers or members.
- Sale of surplus electricity to the national grid.
- Sale of surplus gas to the national gas grid.
- Acquisition of income from taking food waste from restaurants and agri-food companies.

A number of the Irish, Scottish and Welsh interviewees comment on how risk can be minimised by outsourcing the operation of the initiative to a third party, referred to as an energy service company (ESCO). A Scottish interviewee mentions how entering into an ESCO arrangement allows its organisation to focus on fulfilling its core mission.

[4] Three of the installation companies engaged went into liquidation. Two of these were engaged by Irish community organisations and the other by a Scottish housing association.

'We don't have the headache because we're not an energy supplier. Although we have gained a lot of knowledge in biomass, it is not our bread and butter'.

Interviewees from Austria, Wales and Scotland acknowledge that it is not sufficient to cover operational costs. Instead, they note a sufficient return on investment needs to be generated to allow sufficient levels of reserves to be amassed for contingencies and to replace the boiler or anaerobic digestor when its lifespan has been completed.

'We need at least a 7% return on it but I think we're now down to 4% return on projects so they can't be net drains on the charity, they have to make money'.

A number of the Irish interviewees criticised aspects of the regulatory environment and policies which impact on the initiatives.

- The difficulty in getting connected to the electricity grid in Ireland.
- Unlike utility companies, the installers of district heating systems do not have leave way status.
- Building regulations emphasise the installation of renewable energy as opposed to zero carbon measures.
- Local authorities are not obliged to undertake heat plans.
- The lack of a support system across the country to provide community organisations with the requisite expertise.
- The absence of a national capital investment programme to contribute to the costs of purchasing the infrastructure and to cover the installation costs.

The majority of interviewees are of the opinion that providing grants towards the capital costs associated with these initiatives is a more effective and sustainable approach to assist community organisations to embrace renewable energy district heating initiatives. In particular, a leading Austrian expert and pioneer in district heating states that heat incentives lead some projects being initiated for dubious motives.

'...Because it was managed in a way that was creating perverse incentives. The plants were then constructed in a way to maximise the subsidies without any regard to what the actual outcome was and as if it was just to heat air'.

'It makes a lot of sense to keep subsidies out of generation, I think that the UK system is the most ridiculous system I've ever seen in supporting renewable heat'.

The same interviewee draws attention to the experience in Austria where in the first decade of installing district heating systems, significant difficulties were encountered with the quality of the installations. The introduction of management systems as part of the requirement for community organisations receiving funding addressed this difficulty.

'I did my PhD on the topic of community district heating about twenty years ago and at that time about 150 projects had been established. I did a technical appraisal of them and I found that they were expensive to install and inefficient to operate. After the appraisal, a quality management system was introduced which basically consists of a quality manager who is working side by side with the planner of project who is doing the technical planning'.

Although the motives for the promoters of these initiatives are varied, a large number of interviewees are of the opinion that residents will only embrace heat supplied by these initiatives if it does not require them to spend more money than heating their homes via fossil fuels.

Hence the introduction of a carbon tax, at the required level, which makes biomass heating systems more affordable than obtaining heat from fossil fuels is deemed as the most important policy.

'There has to be a commitment to kind of steer the development away from natural gas towards local bioenergy use. The introduction of a high carbon tax is fundamental to make natural gas more expensive to use'.

The Department of Communications, Climate Action and Environment[5], according to two policy makers, are in the process of implementing a range of policies in relation to the diffusion of these initiatives.

- The Energy White Paper commits to developing a policy framework to encourage the development of district heating in Ireland. An inter-Departmental and inter-agency Working Group, chaired by the Department of Communications, Climate Action and Environment, has been established to develop this framework.
- The policy measures designed to support improved energy sustainability in the heat sector were discussed. These include the energy efficiency grants for homes which are operated by the Sustainable Energy Authority of Ireland (SEAI). The grants promote a "fabric first" approach which encourages householders to first reduce heat losses, making it easier and cheaper to heat a home.
- Supports for the non-domestic sector include the Support Scheme for Renewable Heat (SSRH). The scheme is designed to financially support the adoption of renewable heating systems by commercial, industrial, agricultural, district heating and other non-domestic heat users at sites not covered by the EU Emissions Trading System. The first phase of the SSRH, an installation grant for heat pumps, opened for applications on 12 September 2018. This phase of the scheme will support ground, air and water source electric heat pump installations providing grant-aid of up to 30% of the installation cost. The first phase of the scheme was implemented under the state aid General Block Exemption Regulation (GBER) and did not require prior approval from the European Commission.
- The second phase of the scheme, an operational support for biomass boilers and anaerobic digestion heating systems, cannot be accommodated within the provisions of the GBER and, therefore, must follow the full state aid notification process. It is intended to open the second phase of the SSRH for applications early in 2019, subject to the State aid process. The Department of Communications, Climate Action and Environment is engaging with the European Commission in order to obtain this approval.
- Part L of the Building Regulations, which come within the remit of the Department of Housing, Planning and Local Government, sets out the renewable energy requirements for new and refurbished buildings.
- The Climate Action Fund is one of the four funds established under the National Development Plan 2018-2027 as part of Project Ireland 2040.

Discussion and conclusion

As Austria has over 2,000 community-owned renewable energy district heating initiatives, and other countries have fewer than 20 each, these countries can learn lessons from how Austria supports communities to establish and maintain these initiatives. In relation to the role of the State, grants towards the costs of the purchase of the boiler and installation of the pipe network is pivotal to community organisations being in a position to finance the construction of these initiatives. Austrian interviewees are of the opinion that heat subsidies are not sustainable. The State should also provide feasibility study-funding to the promoters of these initiatives to provide

[5] The Irish Government's department which has responsibility for formulating energy policy and addressing climate change

evidence of the cost savings associated with these heating systems. The findings could be used to convince residents of the benefits of supporting such initiatives.

The findings indicate that organisations developing these initiatives should secure the necessary expertise in three ways. The majority of Irish initiatives acquired their expertise from developing the systems. Indeed, the promoters of the Irish initiatives are motivated to creating sustainable communities. Therefore, the Irish cases are probably not typical of Irish communities in general as they do not possess residents who would have that level of motivation. The Welsh case, a national voluntary organisation, is characterised by having a subsidiary company to provide the necessary expertise. The third approach, as pertains to Austria, entails the State resourcing a network of regional support agencies charged with supporting community organisations to develop these initiatives. Similar to Austria, the other countries should develop support agencies, on a regional basis, to provide communities with the relevant expertise to be in a position to establish and maintain these initiatives. Indeed, the Austrian practice of not releasing grant funding to cover the capital costs associated with these initiatives unless a community organisation engages the designated technical support agency should be state policy in Ireland.

Pringle's (2015) theoretical framework focuses on the capacities required for the successful implementation of community renewable energy projects (which includes renewable energy co-operatives) in rural settings. Although this is a robust framework, when applied to Irish communities it may require some modification to detail the capacities required to successfully implement these initiatives. With regard to individual capacity, urban communities, particularly marginalised communities, tend to have a smaller cohort of individuals with the skills, knowledge and values to initiate community renewable energy co-operatives. This could have repercussions for the amount of time these individuals need to invest for the initiative to become operational. Community leaders could become over-committed which could lead to personal repercussions, due to their enthusiasm (Seyfang, 2007). Therefore, the framework could be adjusted to specify the importance of empowering novice members. With regard to social capital, some communities, particularly socio-economically marginalised neighbourhoods, may not have the knowledge about how to engage with the local government system and local development organisations, in order to secure grant funding.

In relation to cultural capacity, the majority of communities would not have a history of developing these initiatives, and therefore values associated with their establishment should be broadened. Perhaps the greatest challenge in the development of these initiatives in Ireland is to address the pervasive culture of individualism and consumerism which has taken root in Irish society (Kirby, 2010). This cultural change will require a number of interventions, over a lengthy period of time, by community organisations, trade unions and progressive political parties to demonstrate that another Ireland is possible where the benefits of the economy are not unequally apportioned on the basis of class. One potentially effective measure would be to deliver an awareness campaign in schools, youth organisations, community organisations and third level institutions on the potency of social enterprise in addressing the many socio-economic issues Ireland is encountering.

The research findings allude to these initiatives encountering a number of challenges. Therefore, resilience within the governance structure of these initiatives could be included as a component of the theoretical framework.

The theoretical framework does not place much weight on the importance of community engagement. In addition, the framework also does not place much emphasis on the values that exist among residents as opposed to those that pertain to individuals active among community organisations. This is an important factor when one considers the level of residents' resistance in Ireland to the installation of renewable energy technology.

There is a wealth of research which outlines the societal benefits of renewable energy initiatives (Tahram, 2015). Therefore, it is incumbent on the Irish State to develop policies in assisting communities to establish these initiatives. These policy areas include procurement, legislative reform including residential planning regulations, finance and access to the national grid.

The economic motive is deemed an important driver of residents embracing these initiatives. The introduction of a carbon tax at a level which would make heat from biomass-fuelled initiatives comparable in price to heat derived from fossil fuels would be a significant step forward.

The establishment of community-owned renewable energy district heating initiatives in Ireland has the potential to contribute to the achievement of several of the UN Sustainable Development Goals (UN, 2018). Firstly, it could help to reduce fuel poverty, which would lessen the proportion of households experiencing consistent poverty and material deprivation (Goal 1). Secondly, it would contribute to the realisation of Sustainable Development Goal 7, to "Ensure access to affordable, reliable, sustainable and modern energy for all"." Thirdly, it would contribute to the establishment of sustainable communities (Goal 11).

Bibliography

Bauwens, T. (2013) 'What Roles for Energy Cooperatives in the Diffusion of Distributed Generation Technologies?' Available at SSRN: http://ssrn.com/abstract=2382596 or http://dx.doi.org/10.2139/ssrn.2382596 retrieved on the 20th April 2018.

Borschee, J. and McClurg, J. (2003) Towards a better understanding of social entrepreneurship – Some important distinctions. <http.www.se-alliance.org> sourced August 2006.

Burch, S. (2010) 'In pursuit of resilient, low carbon communities: an examination of the barriers to action in three Canadian Cities', *Energy Policy*, 38, 7575-7585.

Burck, J; Marten, F; Bals, C; and Höhne, N. (2017). Climate Change *Performance Index-Results 2018.* Bonn: Climate Change Network International.

Braun, V., Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3 (2) 77-101. Available from: doi.org/10.1191/1478088706qp063oa.

Chittum, A., and Ostergaard, P. (2014) 'How Danish communal heat planning empowers municipalities and benefits individual consumers', *Energy Policy*, 74, 464-475.

Connolly, D., and Mathiesen, B. (2014) 'A technical and economic analysis of one potential pathway to a 100% renewable energy system', *International journal of Sustainable Energy Planning and Management*, 1, 7-28.

Crossan, D. and Van Til, J. (2008). 'Towards a classification framework for not-for-profit organisations – the importance of measurement indicators', paper presented at the 8th ISIR international conference, *The third sector and sustainable change: new frontiers for research*, Barcelona: July 9-12 2008.

Doyle G. (2019) 'Socialising economic development in Ireland: Social enterprise an untapped resource' in Maher, C. (Ed.) *Value Creation for Small and Micro Social Enterprises.* Hershey, PA: IGI Global.

Doyle G., and Lalor, T. (Eds.) (2012) *Social Enterprise in Ireland: A People's Economy?* Cork: Oak Tree Press.

Gartland, D., and Bruton, T. (2016) *A Guide to District Heating in Ireland.* Dublin: Irish Bioenergy Association.

Kirby, P. (2010). *Celtic Tiger in Collapse – Maintaining the Weaknesses of the Irish Model.* Basingstoke: Palgrave Macmillan.

Kirby, P., and O'Mahony, T. (2018). *The Political Economy of the Low-Carbon Transition: Pathways Beyond Techno-Optimism*. London: Palgrave Macmillan.

Lantz, E. (2008). Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office. NREL/TP-500-44344. Golden, CO: National Renewable Energy Laboratory.

Maldener, R. (2007) 'Innovation diffusion, public policy and local initiatives. The case of wood-fuelled district heating systems in Austria', *Energy policy*, 35(3),1992-2008

Mathiesen, B., Lund., and Karlsson, K. (2011) '100% renewable energy systems, climate mitigation and economic growth', *Applied Energy*, 88(2), 488-501.

Middlemiss, L., and Parrish B.D. (2010) 'Building capacity for low-carbon communities: The role of grassroots initiatives', *Energy Policy*, 38, 7559–7566. Available from: https://doi.org/10.1016/j.enpol.2009.07.003.

Nyssens, M. (Ed.) (2006) *Social Enterprise: At the Crossroads of Market, Public Policies and Civil Society,* London and New York: Routledge

Parajuli, Ranjan. (2012) 'Looking into the Danish energy system: Lesson to be learned by other communities,' *Renewable and Sustainable Energy Review*s, 16(4), 2191-2199.

Pringle, R. (2015) *Moving Towards Whole Settlement Energy Self- Sufficiency in Rural Communities.* Unpublished PhD dissertation in Newcastle University.

Quarter, J., Ryan, S., and Chan, A. (Eds.) (2014) *Social Purpose Enterprises: Case Studies for Social Change*. Toronto; Buffalo; London: University of Toronto Press. Retrieved from http://www.jstor.org/stable/10.3138/j.ctt1287vs

Ridley-Duff, R., and Bull, M. (2016) *Understanding Social Enterprise: Theory and Practice.* London: Sage

Robbins, C. and Rowe, J. (2002) 'Unresolved responsibilities: exploring local democratisation and sustainable development through a community-based waste reduction initiative', *Local Government Studies*, 28 (1), 37-58.

SEAI (2017) *Energy in Ireland: 2017 Report.* Dublin: SEAI.

Seyfang, G. (2007) 'Growing sustainable consumption communities-The case of local organic food networks', *International Journal of Sociology,* 27 (3/4) 120-134. doi.org/10.1108/01443330710741066.

Sperling, K., Hvelplund, F and Mathuesen, B. (2011) 'Centralisation and decentralisation in strategic municipal energy planning in Denmark', *Energy policy,* 39, 1338-1351.

Tahram, M. (2015) 'Renewable energy co-operatives: A review of demonstrated impacts', *Journal of Entrepreneurial and Organisational Diversity,* 4(1)104-120. Available from: http://dx.doi.org/10.5947/jeod.2015.006.

Toke, D. (2005) 'Community wind power in Europe and in the UK', *Wind Engineering* 29 (3).

UN (2018) *The Sustainable Development Goals Report 2018.* New York: United Nations.

Walker, G. (2008) 'What are the barriers and incentives for community-owned means of energy production and use', *Energy Policy,* 36(12) 4401-4405. Available from: doi: 10.1016/j.enpol.2008.09.032.

Walker, G., Hunter., S., Devine- Wright, P., Evans, B., and High, H. (2010) 'Trust and community: Exploring the meanings, contexts and dynamics of community renewable energy', *Energy Policy*, 38, 2655-2633.