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The Heat is On: The Collaborations, Capacities, and Management Style Required For The Establishment and Sustainability of Community-owned Renewable Energy District Heating Systems In Austria, Ireland, Northern Ireland, Wales, and Scotland

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

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The heat is on: The collaborations, capacities, and management style required for the establishment and sustainability of community-owned renewable energy district heating systems in Austria, Ireland, Northern Ireland, Wales, and Scotland

Dr. Gerard Doyle
Environment and Planning
TU Dublin
Dublin, Ireland *gerard.doyle@tudublin.ie*

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 highlight the pivotal role the State performs, both at national and local level, in creating the conditions essential for the establishment of community-owned renewable energy district heating systems. In particular, the State can provide funding for these initiatives to acquire the management and technical expertise essential for their establishment and maintenance. This paper will also 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 Middlemiss and Parrish (2010) which consists of four categories of capacity. The research methodology involves a case study with cases from Austria, Ireland, Northern 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 - including management supports and training principals in managing such initiatives. The research also points to the importance of engaging with a number of stakeholders. Managers need to value engagement with residents living in local communities and also perform a key role in ensuring community-owned renewable energy district heating initiatives become financially sustainable.

Keywords: biomass, communities, district heating, and renewable energy.

1 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 & O'Mahony, 2018). 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 (Sustainable Energy Authority of Ireland, 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. The recently published Climate Action Plan outlines how Ireland can transition from fossil fuel dependency. According to the plan, the public sector will make a significant contribution to the generation of renewable heat through setting increased targets for the generation of renewable heat from district heating systems (DECC, 2021). In addition, the plan affords communities a central role in the transition through the establishment of community renewable energy initiatives including district heating systems (DECC, 2021).

There is evidence that community-owned renewable energy projects secure greater support than investor-owned ones (Roby & Dibb, 2019). Thus, as a result of less resistance to renewable

energy projects, community ones are more likely to secure planning permission (Savaresi, 2019). However, they tend to require the support of local authorities to become established (Magnusson, 2011). This support can take a number of forms. First, local authorities can complete heat plans which provide the rationale for the formation of community-owned renewable energy district heating initiatives (Connolly & Mathiesen, 2014). Second, local authorities can pilot renewable energy district heating systems in their buildings (Paiho & Saastamoinen, 2018). In so doing, institutional resistance is reduced to the deployment such technology. Third, local authorities can provide funding to put in place management systems essential for the establishment and maintenance of these initiatives (Van der Waal, 2020).

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, this paper examines the capacities needed for the successful implementation of and maintenance of community-owned renewable energy district heating initiatives in Ireland. The core question being addressed is:

What capacities contribute to the successful implementation and maintenance of community-owned renewable energy district heating initiatives in Ireland?

District heating entails transferring thermal energy from a centralised source by a pipeline system to its end users (Gartland & Bruton, 2017). The heat used is metered at each building. District heating systems can come in different sizes such as:

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

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

This paper has a number of elements. Section 2 provides a review of the relevant literature pertaining to the research question. It comprises a theoretical framework and the context for community-owned renewable energy district heating systems. The methodology is outlined in Section 3, that contains the case selection strategy, the methods employed, and an outline of how the data is analysed. Section 4 details the research findings. It outlines that the promoters of community-owned renewable energy district heating initiatives require a range of expertise. They need to be trusted within their respective communities. The initiatives require supports. The research also points to the importance of engaging with different 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. Section 5 provides a discussion and conclusion. The Appendix contains the lists of questions employed to guide the interviews.

2 LITERATURE REVIEW

2.1 Theoretical Framework

The concept of capacity refers to the ability of members of a community or indeed the community itself to make changes by harnessing the resources at their disposal either individually or collectively (Middlemiss & Parrish, 2010).

[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.

A theoretical framework is employed which encompasses individual, structural, cultural, and infrastructural capacities that are interlinked (Middlemiss & Parrish, 2010. Middlemiss and Parrish (2010) define individual capacity as the resources held by individuals within a community. Resources comprise three components: (i) the understanding individuals have of sustainability issues, (ii) their willingness to act, and (iii) the skills they possess to act. Middlemiss and Parrish (2010) assert that an individual's social context shapes their capacity to initiate social enterprises. The structural capacity of a community focuses on the culture and values pertaining to organisations within a community that have an influence over communities' efforts to implement social enterprises with an environmental focus (Middlemiss & Parrish, 2010). Politicians are included in this category. Infrastructural capacity refers to the stock of infrastructure that is present in communities which is conducive to the drive to promote sustainability (Middlemiss & Parrish, 2010). Some communities have infrastructure which makes them more conducive to the establishment of community-owned renewable energy district heating initiatives. Cultural capacity refers to the level of commitment and openness to sustainability that exists within a community (Middlemiss & Parrish, 2010). It is influenced by the historical context around sustainability within a community.

Building on the above work of Middlemiss and Parrish (2010), Pringle's (2015) theoretical framework narrows the focus from sustainable living to exploring community energy. There are four categories of capacity which constitute the theoretical framework]. 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. The social context of an individual shapes their capacity to initiate community renewable energy schemes (Middlemiss & Parrish, 2010). The capacity for individuals to act is linked to the resource availability within a community (Robbins & Rowe, 2002).

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 (Pringle, 2015). 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., 2007).

The above four capacities are interlinked and have an impact on one another ((Middlemiss & Parrish, 2010).

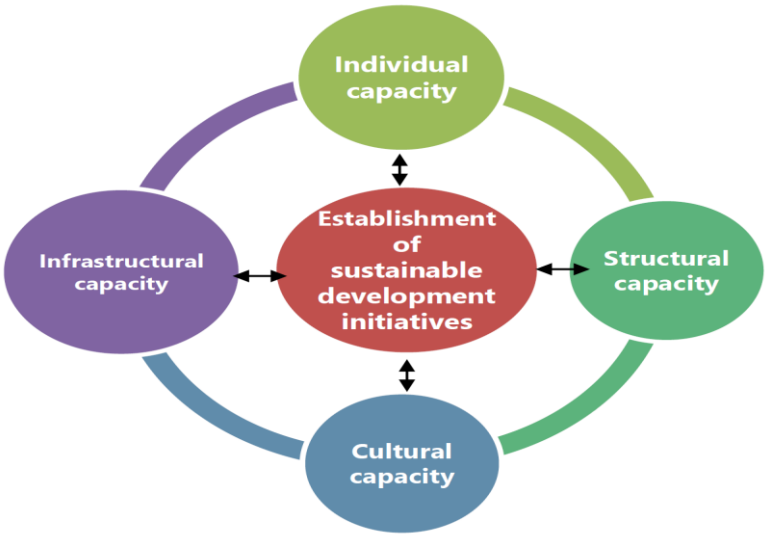

FIGURE 1: Adapted from the theoretical frameworks of Middlemiss and Parrish (2010) and Pringle's (2015).

The above theoretical framework focuses on the capacities required for the successful implementation of community energy initiatives. Although the above framework is robust, it requires some modification when applied to community-owned renewable energy district heating initiatives. This modification is necessary to detail the capacities required to successfully implement these initiatives.

The research has highlighted that 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.

With regards to infrastructural capacities, it was surprising that securing the land for the district heating system was not considered a challenge by any of the cases. However, access to a reliable source of biomass is critical to successful operation of these initiatives. Therefore, this should be incorporated into the framework.

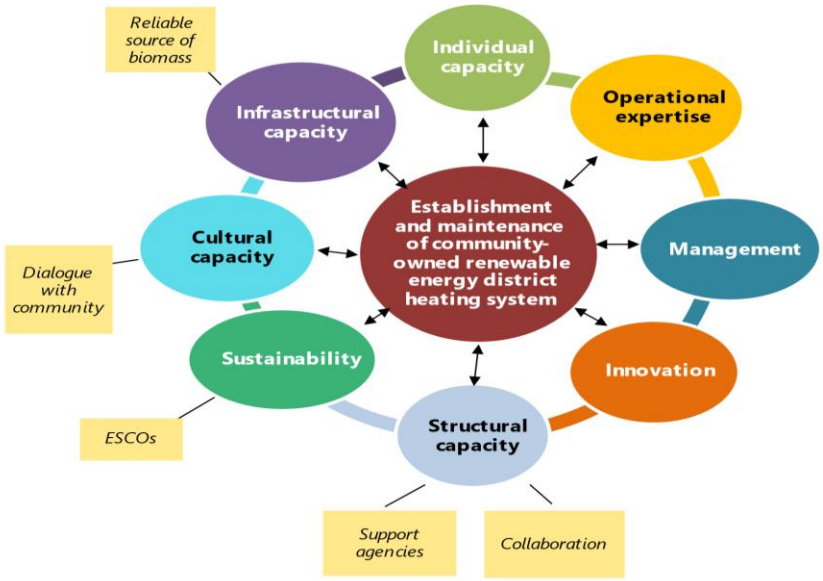

FIGURE 2: Theoretical framework incorporating research findings

The research findings allude to community-owned renewable energy district heating 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. Indeed, it needs to be modified to take into account the fact that managers need to both value and have the capacity to engage with their respective communities. 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.

State agencies, such as Teagasc[2], should encourage and support farmers to allocate a proportion of the land for growing biomass. Research should be undertaken to examine how credit unions could provide finance to community organisations intending to develop community-owned renewable energy district heating systems.

2.2 Key capacities for the establishment of community-owned renewable energy initiatives

A desire for autonomy is recognised as a motivating factor in mobilising communities to develop renewable energy co-operatives, in particular, to gain greater control over their energy supply (Pringle, 2015). Walker (2008) elaborated on the concept of autonomy to identify the following motives in establishing community renewable energy initiatives:

[2] Teagasc – the Agriculture and Food Development Authority – is the national body in Ireland providing integrated research, advisory and training services to the agriculture, food industry and rural communities (www. teagasc.ie).

- Provides a source of income generation for communities and a focus for local regeneration. In so doing, these initiatives can galvanise the local economy.
- Supplies households with a cheaper supply of energy (heat and electricity) than energy corporations.
- Enables local control over the process of developing renewable energy initiatives.
- Enables community leaders to put into practice their ethical and environmental values.

In relation to economic motives, Walker's (2008) assertion regarding the supply of cheaper energy is supported by Chittum and Østergaard (2014), who highlight how Danish district heating systems that are mutually owned by the customers can lead to lower-cost supply of heat to households. Furthermore, the members value the transparency associated with how energy costs are set. Regarding local economic development, Leicester et al. (2011) identifies employment generation and the provision of necessary infrastructure for industrial development as motives for developing sustainable development initiatives, including renewable energy co-operatives. Furthermore, sustainable development initiatives can serve as a mechanism for the social and economic regeneration of rural communities (Hain et al., 2005).

Regarding individual capacity, there are a number of key skills that individuals need during the planning, mobilisation, and developmental phases associated with community-owned renewable energy district heating systems (Seyfang et al., 2014). These can be categorised into interpersonal, technical, and organisational skills. Interpersonal skills such as confidence, resilience, and communication are considered crucial to the development of community-owed renewable energy district heating initiatives (Sperling, 2017). Technical skills include the ability to draft and interpret financial management reports, knowledge of renewable energy technology, and management expertise (Sperling, 2017). The organisational skills that key individuals require include the capacity to undertake meaningful consultations and to make effective decisions (Becker, Kunze, & Vancea, 2017). The vision and styles of leadership of key members are considered as being critical to the success of community-owned renewable energy district heating systems (Sperling, 2017; van der Horst, 2008).

With regards to structural capacities, the presence of community organisations and supportive state and local development institutions can contribute to overcoming a range of barriers (Mulugetta et al., 2010). Strong relationships with community organisations and state agencies can lead to them either directly performing the role of animator of community energy initiatives/renewable energy co-operatives or providing funding for communities to secure the necessary expertise (Hain et al., 2005; Meister et al., 2020). In particular, local authorities can perform a central role in directly enabling communities to develop community-owed renewable energy district heating initiatives through the provision of supports and as collaborative partners (Wirth, 2014), or indirectly through the establishment and resourcing of intermediaries - actors that create ‘new possibilities and dynamism within a system’ (Howell, 2006, p. 104). The lack of intermediaries serves as a barrier to communities developing community-owned renewable energy initiatives (Watson et al., 2020). Infrastructural capacities, such as access to appropriate tracts of land, are required for the deployment of renewable energy co-operatives’ installations (Hain et al., 2005).

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). In Austria, these support agencies provide strategic management expertise to nascent community organisations committed to the development of community-owned renewable energy district heating systems (Rakos, 2001). Moreover, research highlights

the importance of management employing a long-term strategy for the establishment of renewable energy initiatives (Thollander & Dotzauer, 2010). Indeed, this intervention contributes to the long-term sustainability of community-owned renewable energy initiatives (Savaresi, 2019).

The provision of a range financial supports is also deemed critical to the establishment and diffusion of community district heating systems (Maldener, 2007). Managers of these initiatives with financial management expertise enhance the likelihood of them becoming financially sustainable (Chittum & Østergaard, 2014). Managers of community-owned renewable energy district heating systems with limited management capacity can result in these initiatives failing to effectively respond to challenging circumstances (Hufen & Koppenjan, 2015).

District heating systems minimise the risk of households experiencing breakdown in the heating system producing their heat (Chittum & Østergaard, 2014). The risk of households linked to a district heating system being charged excessive prices for their heat is minimised when the customers are empowered to form a consumer co-operative (Chittum & Østergaard, 2014). A willingness to participate in co-operatives is underpinned by a belief in co-operation and mutuality (Chittum & Østergaard, 2014). However, in Ireland, a culture of individualism prevails which presents a barrier to participation in these initiatives (Doyle, 2019).

The engagement of Energy Service Companies can minimise financial risk to the consumers of these initiatives (Chittum & Østergaard, 2014). In relation to the development of district heating systems 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 systems (Maldener, 2007). In Ireland, the lack of intermediaries serves as a barrier to communities developing community renewable energy initiatives (Watson et al., 2020)

Two additional sets of actors in this space are (a) regional politicians for their defence of grant funding for district heating systems and (b) scientists for their promotion of state-of-the-art technology. The grants on offer to farmers to produce biomass fostered new forms of co-operation between farmers and residents of villages to develop district heating initiatives.

In Denmark, resources are allocated to the assessment of costs of district heating systems at national and local levels for different stakeholders. The findings of these assessments give confidence to district heating initiatives (Chittum & Østergaard, 2014).

Cultural capacity refers to the level of commitment and openness to sustainability that exists within a community (Middlemiss & Parrish, 2010). As stated above, cultural capacity is influenced by the level of commitment to the values associated within the community, and the historical attitude, towards sustainability (Mundaca et al., 2018). 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).

The terms 'sustainability' and 'sustainable development' are often used interchangeably. Nonetheless, when used in an academic context, they are separated to refer to the process (sustainable development) and the outcome (sustainability). Roseland (2000, p. 80) states that sustainability '…requires maintaining an adequate per capita stock of environmental assets for use by future generations and avoiding irreversible damage to any significant asset'.

Sustainability has positive connotations and is used in a wide array of academic disciplines (Roseland, 2000). There are a number of interrelated elements to the concept (Connolly, 2002). These are:

- Environmental protection, with the objective of integration of environmental protection and economic development.
- Equity between current populations and future generations.
- Improving quality of life, acknowledging that human welfare is not exclusively strengthened by increasing household income levels.
- Participation by all social groups in society in realising sustainable development (Jacobs, 1995).

Sustainable development, irrespective of its interpretation, infers some level of change from previous development policies (Connolly, 2002). The extent of the change is premised on the ideological perspective of the policy maker (Koglin, 2009).

Finally, regarding policy and regulation, the State performs a central role through legislation and funding to facilitate the transition from heat generated by fossil fuels (Parajuli, 2012). Indeed, investment is pivotal to the development of a vibrant community-owned renewable energy sector (McMurtry, 2018). Research from Denmark demonstrates the interdependence of the national and local governments in the transformation to renewable energy district heating systems (Sperling, Hvelplund, & Mathuesen, 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 systems (Mathiesen, Lund, & Karlsson, 2011). The State needs to provide training for civil and public servants to either initiate or support the development of public and social enterprises (Feldman, 2005).

3 METHODOLOGY

Bryman (2004) explains the 'research methodology' as detailing the philosophical position of the researcher, theoretical considerations, the approaches, strategies and time horizons of the research, and the methods employed.

3.1 Case selection strategy

The research employed a case study approach. Case study is an effective tool when asking 'how' and 'what' questions (Yin, 2018). These categories of questions form the basis of the interviews conducted.

Cases were selected from several jurisdictions. 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 systems in each country. Therefore, these countries could indicate the barriers to the formation of community-owned renewable energy district heating systems. Furthermore, similar to Ireland, community-owned renewable energy district heating systems in Northern Ireland, Scotland, and Wales are located in rural settings. This is not the case in Nordic countries, where these systems tend to be located in urban settings. Austria was selected due to it having over 2,000 community-owned renewable energy district heating systems, 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.

Although there is a variation in the legal structure between some of the cases, all of the cases selected are part of the community and voluntary sectors of their respective countries. They each have a not-for-profit mission. In Austria, Ireland, Northern Ireland, Scotland, and Wales, the cases were selected because the district heating systems were of a similar size.

The cases selected from each country are detailed below:

- Three Camphill communities based in counties Kilkenny and Tipperary, Ireland
- The Cloughjordan Ecovillage located in County Tipperary, Ireland[3]
- Two Camphill communities located in counties Down and Tyrone, Northern Ireland
- A housing association based in Argyll, Scotland
- The National Trust in Wales
- An Austrian renewable energy co-operative

The rationale for selecting the community-owned renewable energy district heating initiatives in the Camphill communities, along with the one in the Cloughjordan Ecovillage, was that these were the only ones in operation in Ireland when the research was being undertaken. Similarly, the two community-owned renewable energy district heating systems in Northern Ireland were the only ones in operation at that time. Regarding the Scottish case, another community organisation was approached but the representative contacted by the author was unable to get agreement from the Board to participate in the research. Therefore, the author proceeded with the housing association. In addition, the author was informed that there was only two such entities in Scotland. The author was also informed that there was only one renewable energy district heating initiative developed by a third sector organisation in Wales.

Finally, the Austrian renewable energy co-operative was selected because the principal was fluent in English and the author does not speak German.

3.2 Methods

Qualitative methods of enquiry were employed to facilitate informants to share their knowledge in a flexible manner during the data collection phase (Bryman, 2010). Semi-structured interviews (and focus groups) were utilised as they allow this flexibility (Creswell, 2014).

Eighteen semi-structured interviews were held with:

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

One online focus group was held with officials from the Scottish Government. The officials preferred to have a focus group rather than participating in semi-structured interviews.

Organisation	Position/Experience
Camphill Community, Ballytobin, Kilkenny	Manager of the Ballytobin Anaerobic community renewable energy company. He was pivotal in the establishment of the renewable energy initiative. He has experience of managing investor-owned businesses.
Camphill Community, Ballytobin, Kilkenny	Director of the Ballytobin Anaerobic community renewable energy company. He has expertise in financial management.

[3] An ecovillage is an intentional, traditional, or urban community that aims to initiate locally-owned processes to develop sustainable lifestyles (www.ecovillage.com)

Camphill Community, Grangemockler, County Tipperary	Principal of the Grangemockler renewable energy district heating initiative. He has extensive knowledge of renewable energy technology and experience in the administration of renewable energy initiatives.
Two Camphill communities based in counties Down and Tyrone	Principal of the two renewable energy district heating initiatives. He has extensive knowledge of renewable energy technology and experience in the administration of renewable energy initiatives.
Cloughjordan Ecovillage	The principal who established the district heating system. He worked as an engineer.
Energy agency	CEO of an energy agency providing support to communities in establishing and sustaining renewable energy co-operatives.
Energy agency providing support for the development of district heating systems	CEO of an energy agency that provides support for the development of district heating systems in the Dublin region.
Regional development agency	Senior policy analyst with expertise in local economic development. Staff member with expertise in assisting communities in establishing community renewable energy co-operatives and was managing an EU renewable energy programme.
Local authority staff	Senior officer (Planning department providing planning permission to organisations engaged in the establishment of community renewable energy initiatives).
Department of Communications, Climate Action and Environment	Two senior civil servants involved in designing policy to support the transition for Ireland to become less reliant on renewable heat generated from fossil fuel.
Sustainable Energy Authority of Ireland (SEAI)	Senior manager responsible for developing and managing programmes to support communities to develop community renewable energy initiatives.
Housing association, Scotland	Technical Services Director with over 20 years' experience working in the social housing sector. She has responsibility for retrofitting housing stock.
The National Trust, Wales	Advisor to the National Trust, Wales, on environmental matters.
Renewable energy district heating co-operative, Austria	Chairperson of a renewable energy district heating co-operative in Salzburg.
The Welsh Government Energy Service	Senior Policy Analyst with responsibility for renewable energy.
Austrian Environment Association	Senior manager with responsibility for the promotion of renewable energy heating systems in Austria.
Wood pellet manufacturer	Representative of the leading wood pellet manufacturers in Austria. He completed a PhD on community-owned district heating systems in Austria.
Scottish Government	Three policy makers with responsibility for renewable energy policy and climate change policy.

TABLE 1: Details of participants' organisation and experience

Face-to-face interviews were held with the representatives of Camphill Community, Ballytobin, Cloughjordan Ecovillage, and the Department of Communications, Climate Action and Environment. The remainder of the interviews and the focus group were held online or by telephone.

A list of trigger questions was used to guide the interviews, and some additional questions were posed, depending on each interviewee's responses. The questions are located in the Appendices. The questions posed to the civil servants, the SEAI official, the regional development agency personnel, and the staff of energy agencies focused on proposed policies and supports that could facilitate communities to establish community-owned renewable energy district heating initiatives.

The author framed each set of questions and reviewed them to ensure that they were related to the core question. Furthermore, a colleague of the author reviewed the questions to ensure that they were valid and framed correctly. Each set of questions was then piloted with two individuals.

The interviewees mainly wished to remain anonymous and, as such, an interviewee identifier (CRE - community-owned renewable energy district heating initiative, ESA - energy support agency, and state – local/central government) and a number have been attributed to each participant, presented in the table below.

Identifier	Interviewee organisation	Role
CRE-1	Community-owned renewable energy district heating initiative	Manager
CRE-2	Community-owned renewable energy district heating initiative	Director
CRE-3	Community-owned renewable energy district heating initiative	Director
CRE-4	Community-owned renewable energy district heating initiative.	Manager
CRE-5	Community-owned renewable energy district heating initiative	Manager
CRE-6	Community-owned renewable energy district heating initiative	Director
CRE-7	Community-owned renewable energy district heating initiative	Director - Wales
CRE-8	Community-owned renewable energy district heating initiative	Manager - Scotland
CRE-9	Community-owned renewable energy district heating initiative	Director – Austria
ESA-1	Support agency - Kilkenny	Chief Executive Officer
ESA-2	Support agency – Dublin	Development Manager
ESA-3	Support agency – Western Development Commission	Senior Policy Officer
ESA-4	Support agency – Austria	Senior Manager
ESA-5	Support agency – Austria	Manager
ESA-6	Support agency – Austria	Manager
STATE-1	Civil/Public Servant	Administrator
STATE-2	Civil/Public Servant	Administrator
STATE-3	Civil/Public Servant	Administrator

TABLE 2: Interviewee identifiers

All interviews were audio-recorded and transcribed verbatim.

3.3 Data analysis

Qualitative thematic analysis was employed to analyse the data. The process of data analysis occurred inductively and deductively. In relation to the former, the themes were developed from the transcripts. 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. Themes were then developed from groups of related codes (Braun & Clarke, 2006). In relation to the latter, four of the themes - individual capacity, cultural capacity, infrastructural capacity, and structural capacity - were taken from the above theoretical framework. The relevant codes were then assigned to the four themes. Table 2 below illustrates how transcripts relate to codes and themes/sub-themes.

Code	Theme/sub-theme
Number of motives for start-up	Motives
Community trusted principals who consulted over previous attempts	Individual capacity - credibility and trust
Support agencies' important role for establishment district heating	Individual capacity - expertise
Capacity to implement strategy	Individual capacity - management
Collaboration with Danish district heating company	Structural capacity - collaboration
Incentives lead to poor project outcomes	Structural capacity - supports
Address dissension through small group discussion	Cultural capacity - dialogue
Reliable source of local biomass	Infrastructural capacity
Energy service company (ESCO) limits financial risk to organisation	Sustainability
External management introduced to ensure effective district heating system is installed	Policy and regulations

TABLE 3: Outline of process of developing codes and themes

4 FINDINGS

The research findings pertain to interviews with individuals associated with community-owned renewable energy district heating initiatives (referred to as initiatives), support agencies, and policy makers. The following themes (motives, individual capacity, structural capacity, cultural capacity, infrastructural capacity, sustainability and policy and regulations) categorise the research findings. These are looked at in turn.

4.1 Motives

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. According to the principal of one initiative in Ireland:

> '*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'. (Interviewee: CRE-2)*

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

4.2 Individual capacity

4.2.1 Credibility and Trust

According to interviewees, who are both principals of these initiatives and employees of support agencies 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. The principal of an Austrian initiative mentioned:

> *'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.' (Interviewee: CRE-2)*

The research indicates that expertise is derived from either within the organisation establishing the initiative or from external agencies. With the 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 stated 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. The principal of an Irish initiative outlined how:

> *'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.' (Interviewee: CRE-3)*

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.

4.2.2 Expertise

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 principal of a Scottish initiative detailed the significant adverse impact of not having the relevant technical expertise:

> *'One mistake we made was not to treat the water and so it was eaten partly by limescale.' (Interviewee: CRE-6)*

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, both principals of these initiatives and employees of support agencies, 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.

Two principals of these initiatives emphasise the importance of having access to mechanical expertise to maintain the installations. In some instances, this expertise was sourced within the community while, in others, it was sourced via support organisations.

4.2.3 Management

Two principals of these initiatives emphasise how managers of community-owned renewable energy district heating initiatives need to have the capacity to implement a strategy agreed by their governance structure. They also need to have both marketing and financial management expertise.

> *'It was essential that our manager had the ability to undertake financial projections and prepare management accounts for the board each month.' (Interviewee: CRE-4)*

In Austria, the community-owned renewable energy district heating initiatives were required by their funders to establish management systems as part of receiving funding. This was to ensure the installations were efficiently and effectively managed.

In addition, the manager must have the capacity to engage and manage stakeholder relationships. In particular, they need to value community engagement.

> *'We would not be where we are today without our manager valuing community engagement.' (Interviewee: CRE-4)*

Indeed, two principals are of the opinion that managers with a background of management in investor-owned businesses do not necessarily have the skills and values to successfully manage a community-owned renewable energy district heating initiative.

4.3 Structural capacity

4.3.1 Collaboration

The principal of one initiative in Ireland outlines how long-term collaborative relationships can be developed through engagement in EU funding programmes. This can enable the transfer of knowledge from initiatives in Austria and Denmark to participating organisations in Ireland. Another interviewee associated with an initiative in Ireland emphasises how he was able to collaborate with a network of individuals with technical expertise in Austria. The same individual said that this provided essential technical knowledge which was not available in Ireland. However, the same interviewee emphasises the need for a management role to manage stakeholder relationships:

> *'X has got a managerial role and you know he understands the community and, d'you know, so he's a local man and he knows you know all the farmers and also to negotiate with the waste management companies that they bring their waste here, you know. So, you need to have a good person know the whole industry and the whole operation.' (Interviewee: CRE-1)*

The principals of two initiatives acknowledge the potential of the LEADER programme in providing capital funding towards the costs of the development of these initiatives.

A number of challenges are encountered in developing these initiatives. The principal of one Irish initiative mentions how Irish people are not inclined to collaborate to the same extent as citizens of Nordic countries:

'The Scandinavians have a willingness to engage with social projects.'
(Interviewee: CRE-5)

The same interviewee is of the opinion that, in Ireland, the dominant culture of individualism is a barrier to the development of these initiatives.

4.3.2 Supports

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, several 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 who are principals of initiatives, the lack of a state grant system compels community organisations to spend time sourcing funding from several sources. Consequently, these 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. A leading expert of renewable energy systems in Austria mentions:

'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.'
(Interviewee: ESA-5)

Another type of support agency provides stakeholder engagement expertise to enable community organisations to both navigate the State apparatus and engage with residents. A principal of an Irish initiative emphasises that:

'Keeping the project out of the sphere of politics is also an important support.'
(Interviewee: ESA-1)

In Ireland, according to three interviewees who are principals of these initiatives, 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. A principal of an Irish initiative states

'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.' (Interviewee: CRE-2)

4.4 Cultural capacity

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. A principal of an Irish initiative emphasises the potency of the economic rationale for the establishment of these initiatives:

> *'I think what made it happen in most cases was the economic argument.' (Interviewee: CRE-3)*

How dialogue with residents is conducted can have an impact on the outcomes. The principal of an Irish initiative 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.' (Interviewee: CRE-1)*

Three principals are of the opinion that the willingness of households to engage in these initiatives is influenced by cultural factors. Two of these interviewees observe that Irish society does not have a value system that prioritises equality or social solidarity. One of the three interviewees states 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.' (Interviewee: CRE-1)*

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

4.5 Infrastructural capacity

Two interviewees commented on having access to a reliable source of biomass is critical to successful operation of these initiatives. This can be achieved through encouraging and supporting farmers to engage in biomass production.

4.6 Sustainability

Interviewees who are principals of these initiatives and employees of support agencies 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. One principal reared in Germany mentioned:

> *'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.' (Interviewee: CRE-2)*

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, the manager of a housing association in Scotland that established an initiative mentions how 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.' (Interviewee: CRE-5)*

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 argued that financial sustainability of the initiative can be enhanced through:

- 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 ESCO. The manager of a housing association in Scotland that established an initiative mentions how entering into an ESCO arrangement allows its organisation to focus on fulfilling its core mission.

> *'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.' (Interviewee: CRE-8)*

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. The employee of national voluntary organisation in Wales mentions that:

> *'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.' (Interviewee: CRE-7)*

4.7 Policy and regulations

A number of the Irish interviewees (both principals of these initiatives and staff of support agencies) 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.

[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.

- 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, including management 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 systems. 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.' (Interviewee: ESA-4)*

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.'. (Interviewee: ESA-4)*

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.' (Interviewee: ESA-5)*

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

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

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 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. 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.
- 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.

5 DISCUSSION AND CONCLUSION

Both the literature and research findings highlight economic autonomy as being a motive for the formation of community-owned renewable energy district heating initiatives. However, the research findings point to environmental reasons as being the most common motive for their establishment – a conclusion which differs from the literature.

According to the literature and findings, community-owned renewable energy district heating systems require the involvement of individuals who possess integrity and are trusted by the community in which the initiative is located. Moreover, the findings point to individuals in leadership positions tending to possess strong organisational skills. The findings and the literature both indicate a similar range of expertise is required for the successful operation of these initiatives. However, administrative expertise is not mentioned in the literature. In Ireland, the establishment of these initiatives has required individuals with mechanical knowledge as there is a paucity of technical expertise in the area of district heating technology.

The literature and research finding both emphasise the importance of structural capacity to the formation of community-owned renewable energy district heating initiatives. However, both differ in the location of organisations that can support their formation. The literature points to the organisations being located in the same jurisdiction as the community-owned renewable energy district heating initiatives, whereas the research findings indicate that they tend to be located, with the exception of Austria, in other EU countries.

Regarding supports, a component of structural capacity, the findings suggest that organisations developing these initiatives tend to secure the necessary expertise in three ways. The majority of Irish initiatives acquired their expertise from developing the systems. 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. According to the literature, the State tends to provide this support role, either directly or indirectly. Currently, there is a paucity of support structures to support the managers of community-owned renewable energy district heating systems to oversee the development of these initiatives and sustain them (Watson et al., 2020). Accordingly, managers of these entities need to be innovative and proactive. Notwithstanding managers possessing these attributes, the lack of supports can place managers of these initiatives under unnecessary pressure.
Both the literature and the research findings highlight the importance of support agencies in the establishment and successful operation of community-owned renewable energy district heating systems. The findings state that, in Ireland, with the exception of the support provided by a small number of energy agencies, there is a dearth of support structures available to promoters of prospective community-owned renewable energy district heating initiatives. The situation in Austria is consistent with the literature which demonstrates the importance of support bodies which perform a critical role in the establishment and operation of community-owned renewable energy district heating systems. Indeed, recent research has highlighted the need for 'a "one-stop shop" to be established, where community energy groups can go for information, advice, and support, within an existing agency or a separate body' (Watson et al., 2020, p. 55). 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.

Unlike the literature, the research findings emphasise the critical nature of inclusive and effective community engagement to secure the support of residents in an area towards the installation of a community-owned district heating system. The research highlights how the lack of expertise in undertaking inclusive and effective community engagement processes can stymie the likelihood of projects gaining community support. This can ultimately lead to the projects not proceeding.

The literature points to the importance of citizens possessing values supportive of sustainability. In contrast, the research findings point to residents placing a significant value on economic development over values of sustainability.

The literature points to how policy at national levels can facilitate the development of a community-owned renewable energy district heating sector. The research findings indicate that policy in Ireland lags that of Austria and a number of other EU countries. However, forthcoming legislation in Ireland should enable the development of the sector. In line with the literature, local authorities could perform a leadership role in planning neighbourhoods so that they lend themselves to being heated by district heating systems. In Ireland, credit unions could provide the necessary capital to enable community and voluntary organisations to install renewable energy district heating systems. As Austria has over 2,000 community-owned renewable energy district heating systems, 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 are 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 evidence of the cost savings associated with these heating systems. The findings could then be used to convince residents of the benefits of supporting such initiatives.

Community-owned renewable energy district heating systems have to maintain an equilibrium between achieving their social mission and attaining financial sustainability (Mazzej, 2017). The research findings point to this requirement placing extra demands on both their governance

structures and their management. In relation to the management of these entities, managers need to develop a financially sustainable business (Ridley-Duff & Bull, 2016). This requires them to be able to compile and interpret financial management accounts (Doherty et al., 2009). Moreover, managers of community-owned renewable energy district heating initiatives require particular expertise and attributes to manage these businesses successfully. In addition, they need to have the capacity to forge relationships with a range of stakeholders deemed critical to their initiative becoming sustainable and fulfilling their social mission (Ridley-Duff, 2009). The governance structures can find it difficult to recruit managers with the above range of skills, particularly in light of their inability to match the salaries offered to managers by their investor-owned counterparts.

The research findings point to the inadequacy of mainstream theories of management in explaining the attributes and skills required by effective managers of reuse social enterprises (Murtagh, 2019). The implications for policy-makers is that leadership and management training for managers of investor-owned businesses is not sufficiently comprehensive to meet the range of skills and expertise required by managers of community-owned renewable energy district heating initiatives.

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 to assist communities to establish these initiatives. In particular, local authorities should include in their county development plans a policy to provide renewable heat via district heating systems. Each local authority should detail a strategy for this to be realised. Furthermore, these policy areas should include procurement, legislative reform including residential planning regulations, finance, and access to the national grid.

Finally, the research points to the economic motive as being deemed an important driver of residents embracing these initiatives. The introduction of a carbon tax at a level which would make heat from biomass-fueled initiatives comparable in price to heat derived from fossil fuels would be a significant step forward.

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APPENDIX

The questions posed to the principals and individuals involved in community-owned renewable energy district heating initiatives and systems were:

- How did the idea for a renewable energy district heating system come about?
- What were the motivating factors for individuals to develop a renewable energy district heating system in your locality?
- What is the primary focus of the renewable energy district heating system (economic, education regarding environment, ecological)?
- What were the essential skills/expertise required to transform the idea for a renewable energy district heating system from a concept to generating energy?
- What were the resources required to establish the renewable energy district heating system?
- Did you require resources and supports from outside your community? If so, what were they? Where did you source them? How did you source them?
- What were the challenges encountered in establishing the renewable energy district heating system? How were these overcome?
- Has a formal organisational structure been developed? Could you outline the structure? What were the reasons for opting for this structure?

The questions posed to the civil servants in Ireland, Northern Ireland, Scotland, and Wales were:

- What areas of expertise do you consider the founders of community-owned renewable energy district heating system, in your country, require to establish their district heating systems? What, if any, do you consider to be the shortcomings in expertise and capacity amongst the founding members of community-owned district heating systems in Ireland?
- Does your (relevant country mentioned) Government resource the provision of supports to community-owned renewable energy district heating initiatives? If so, what resources or support are provided to community-owned renewable energy district heating systems?
- What are the reasons for your government allocating resources for the provision of support to the principals of community-owned renewable energy district heating systems?
- What are the gaps in supports and resources, if any, for community-based renewable energy district heating systems, in your country (relevant country mentioned), to be in a position to become sustainable?
- What organisation(s) is best placed to address these gaps in supports and provide these resources?
- What is/are the key policy/policies that currently support the establishment of community-based district heating systems in (relevant country mentioned)?
- What additional policy/policies or aspect of the regulatory framework do you believe, if introduced, would augment the capacity of communities to develop successful renewable energy district heating systems in (relevant country mentioned)?
- Are there any additional supports that need to be introduced to assist communities to establish community-owned renewable energy district heating systems in (relevant country mentioned)?

The trigger questions were piloted with two individuals with expertise in the field.