Energy cooperatives and local ownership in the field of renewable energy technologies: A literature review

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Table of Contents

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List of abbreviations:

BDH	biomass district heating
NIMBY	'Not In My Back Yard' (referring to opposition towards installations based on concerns over local disturbances)
PV	photovoltaics
RET	renewable energy technologies

1 Introduction

With rising concerns over ecological sustainability as well as security of supply, the energy system has come under increasing pressure over the last years and various efforts have been made aiming at a transformation towards more sustainable systems of energy provision. At the grassroots level this has included the establishment of energy cooperatives and other forms of local or community based ownership of renewable energy technologies.

Energy cooperatives have thus introduced new forms of socio-economic organisation to the system of energy provision. While the classical regime of energy provision usually involved highly centralised energy infrastructures with 'end-of-wire captive consumers', locally and cooperatively-owned facilities for energy production can constitute a substantially differing model of energy provision and distribution. Furthermore energy cooperatives and similar initiatives have sometimes also been important sites of technological innovation activities, as in the cases of wind turbine development in Denmark (Olesen et al., 2004).

Existing research in the field has addressed a variety of issues in relation to energy cooperatives. In terms of technology areas, activities in the area of wind energy (often referred to as 'community wind') have clearly been documented most extensively in the literature. Often the focus has been on institutional framework conditions in a particular country, or the comparison of such conditions in different countries. Other issues covered in the literature in relation to energy cooperatives encompass micro-level processes of negotiation, conflict and the build-up of trust as well as the relationship between local ownership and public acceptance of renewable energy technologies (again, especially concerning wind power).

This review is organised along these main themes treated in the literature. The first section following the introduction reviews literature on energy cooperatives by country. Countries were selected either because a significant amount of literature treats energy cooperatives and similar initiatives there (Denmark, Netherlands, UK, partly Germany) or because the countries are of particular interest for the further course of this research project (Germany and Austria). The following sections then present literature on institutional framework conditions, the 'micro-level' and the issue of public acceptance respectively. Each section or sub-section concludes with a summary of central points. A concluding section both summarises important points from the literature review and draws particular attention to issues that may be of interest for the further course of this research project and were not used as organising themes in the preceding sections.

A final note has to be made on the understanding and use of the term 'energy cooperatives' adopted here and, in relation to that, the scope of this literature review. We adopt a broad understanding here in terms of ownership models, encompassing different forms of

collective, citizen-based ownership of energy generating facilities, not necessarily in the legal form of a cooperative. However, our understanding is narrow in the sense that we specifically focus on *renewable* energy generation facilities. A broad variety of terms for such citizen ownership models can be found in the literature, often accentuating different possible characteristics of such initiatives: energy cooperatives, community energy, local ownership, community ownership, small private investors, citizen participation, etc.

In this literature review we have decided not to limit ourselves to the use of one single term but rather to try to choose the most appropriate term in each case - depending on the terms used by the author(s) in focus or what appears to capture the emphasis of their writing best.

2 Country Cases

2.1 Denmark

Jørgensen and Karnøe (1995) provide a historical account of wind energy development in Denmark in which distributed ownership models (farmers, cooperatives, local ownership) played an important role. However, only short reference is made to small cooperatives as dominant the ownership model in the 1970s and to a total of 160.000 Danish households holding shares in at least one turbine [as of 1995?]. They give an overview of the long history of wind energy in Denmark dating back to the 1890s and provide a number of explanatory factors for the 'success story' of wind energy development in Denmark. These include the strength of the anti-nuclear and alternative energy movement, a bottom-up strategy of learning by experience / learning by doing and a good R&D base in which – contrary to the US - necessary adaptations were made in the utilisation of the existing knowledge base from aerospace research.

The authors also point to the *broad actor base* that was necessary for the successful development of wind power in Denmark in the 1970s, including grass-roots entrepreneurs and early industrial entrepreneurs producing turbines, idealistic buyers, anti-nuclear power engineers starting test station, interest organisations such as the Organisation for Renewable Energy, the Association of Danish Wind Power Owners and the Association of Danish Wind Mill Manufacturers.

From their account it also becomes clear that significant *changes in actor roles* took place over the course of the 1980s and 1990s with industry taking over technological development of wind turbines, and a general process of concentration. This also resulted in a weakening of links to the alternative energy movement. However, Jørgensen and Karnøe also point out that this does not simply amount to a return to traditional actor constellations in the energy system, since also the roles of power companies have changed and since the institutional setup shifted in favour of more decentralised systems.

Danielsen (1995) also provides a brief account of the 'success story' of wind power development in Denmark, emphasising the *role of citizens* organised in 'windmill guilds'. According to Danielsen 80% of wind power capacity in Denmark [as of 1995?] was installed by citizen-led initiatives, only 20% by big power utilities, that were rather forced into wind power and were in fact rather reluctant to engage with it. Danielsen especially points to the changes that have occurred in *spatial planning* for wind energy projects, moving from an 'anarchic period' in the 1970s to more integrated spatial planning. However, new administrative procedures introduced in the 1990s in spatial planning have apparently slowed down the installation rate of wind power. Against this background Danielsen argues for large-scale off-shore wind farms (reducing public opposition) with the possibility of ownership by windmill guilds (not possible at the time of writing of the paper).

Kemp, Rip and Schot (2001) provide a comparison of Danish and Californian wind power policy in 1970s and 1980s. They use this comparison to argue for the approach of '*Strategic Niche Management*', a policy approach aiming at the provision of temporal support for learning processes around new technologies (e.g. sustainable energy technologies). They argue that the small-scale, stepwise form of wind turbine development, that was situated in Danish cooperatives and self-build groups, accompanied by gradually emerging policy support, lead to more successful design variants and diffusion patterns than wind turbine development in the US, notably California, driven by large-scale business investments and R&D programmes.

Olesen, Maegaard and Kruse (2004) also provide a historical account of the Danish windmill tradition, highlighting the role of community ownership from a normative perspective. Furthermore they also describe *relevant legislation aspects* for wind power development, among the accepted forms of ownership. Other aspects include spatial planning, technical issues, taxation and feed-in regulation.

With respect to policies on citizen-based ownership models they point out that original legislation in the late 1970s favoured ownership by people living in the neighbourhood of wind farms. In order to create broad popular involvement original policies also restricted the shares of private individuals to an amount corresponding to their household's private consumption. However, these share restrictions were later relaxed and eventually abandoned in 2001. In addition to that, policies were adapted in a way to allow for investors to purchase land for windmill installations without living in the neighbourhood, thus increasingly turning wind power installation into *investment projects*. Concerning offshore-wind farms Olesen et al. (2004) note that consumers were not allowed to invest in such projects up until 1997. Graphs on the distribution of ownership types in wind energy in Denmark (1978-2002) show that during a first 'boom' period around 1990, cooperatives

constituted the most popular form of ownership. After 1994 single ownership (mostly farmers but also other) started to be more widely spread.

Furthermore Olesen et al. (2004) point out that cooperatively owned wind farms usually take on the legal form of a full liability company (tax advantages). Due to the full liability these cooperative-like companies are usually managed so as to build up reserves and to make no debts. Financing of cooperative shares is easily accessible, as some banks provide loans without assessing the private economy of the buyer if the overall project is trusted because (shares act as a security for the loan).

With respect to planning issues, Olesen et al. (2004) provide a description of typical planning procedures, especially for the case of wind power cooperatives. Also, while they highlight the integration of wind power in spatial planning as a success for spatial planning, they also criticise the status quo of the planning regime for making things easier for larger investors, thereby creating local opposition to wind power. The authors also present a brief case study on a locally owned wind turbine and highlight the benefit of avoiding local conflict.

In a master thesis focussing on a comparison of the development of the Danish and Dutch wind power industries *Boon (2008)* provides some information on *framework conditions* for different citizen-based ownership models for wind power in Denmark. As he notes, in the late 1970s there were simple rules to connect privately (individually) owned turbines to the grid, but these rules did not apply to cooperatively owned turbines, an issue that was finally resolved in 1981, following pressure from the Danish wind owners association “DK Vind”. Furthermore Boon notes that up until 1990 cooperatively-owned turbines constituted the dominant ownership model in Denmark, but starting from the 1990s turbine sizes were increasing to a point that they were no longer attractive for cooperatives anymore. Boon also refers to the ‘re-powering development’ in Denmark during which, from 2002 onwards, incentives were provided for taking down several small turbines and replacing them by fewer larger ones. As professional investors also had become very interested in wind energy at that time and were prepared to pay high prices, many farmers and cooperatives were tempted into selling their turbines (Boon 1995 quoting Preben Maegaard p. 52).

Bolinger (2001) describing community wind ownership schemes in different countries, provides an overview of different support mechanisms for wind power in Denmark. In relation to community ownership models in Denmark he notes that they, although frequently referred to as cooperatives, are in fact general partnerships (“Interessentskab”). Due to Danish ownership regulation (as of 2001) wind turbines had to be owned directly by electricity consumers [or utilities?], so the legal form of a cooperative could not be applied. Bolinger provides further details on financing, taxation and liability issues in relation to Danish wind

partnerships and points to the Middelgrunden wind turbine partnership that has set up a large offshore wind farm as an exceptional example.

Summary – country case Denmark

- The development and diffusion of wind power in Denmark from the 1970s onwards generally is seen as an impressive success story. In the early years these developments were strongly rooted in **citizen-led bottom-up initiatives** (Danielsen, 1995; Kemp et al., 2001; Jørgensen and Karnøe, 1995). Different explanatory factors can be provided for this development, including the **strength of the anti-nuclear** / **alternative-energy movement** and a small-scale **stepwise form of turbine development** accompanied by gradually emerging and **continuously adapted policy support** (Kemp et al., 2001, Jørgensen and Karnøe, 1995).
- Due to ownership restrictions, joint ownership of wind turbines in Denmark typically has taken the form of a **general partnership** / **full liability company** rather than that of a cooperative (Bolinger, 2001, Olesen et al., 2004).
- **Changes in actor roles** / **actor constellations** have clearly taken place over time, both in terms of turbine production, marked by the emergence of a specialised industry, and in terms of dominant ownership models for wind farms, marked by the entry of professional investors e.g. during the re-powering development and by utilities being 'forced' into wind power projects. This also resulted in a weakening of links to the alternative energy movement. These changes in actor constellations were partly induced by policy adaptations but also by technological developments (larger turbines) and increasing profitability expectations (Olesen et al., 2004, Jørgensen and Karnøe, 1995, Boon, 2008).
- A number of **policy issues** have been relevant for the setup of citizen-owned wind farms in Denmark, including the admissibility of particular ownership models, spatial planning issues, regulations concerning grid-connection, tax issues and feed-in tariffs (Olesen et al., 2004).

2.2 The Netherlands

Agterbosch, Vermeulen and Glasbergen. (2004) review the *systemic conditions* for wind power in the Netherlands in the 1990s and analyse how these affect the 'implementation capacity' of different entrepreneurial groups, including energy cooperatives and small private investors (mainly farmers). They point out that the policy framework does not establish an overall 'implementation capacity' but rather facilitates some and hinders other types of entrepreneurs.

With respect to cooperatives they emphasise the limited reactivity to the institutional framework due to their 'idealistic approach' (goal to promote a sustainable society rather than to make profit). However, the authors also find that cooperatives were 'less well equipped to deal with the depersonalisation of the wind power supply market, increased competition, and the increase in the scale of wind power projects' (p. 2062) that occurred during the 1990s.

The authors also provide some background information on the history of Dutch wind power cooperatives, noting that all of them (total: 28) were founded in the time span from 1986 to 1992 with strong links to the anti-nuclear movement. The largest part of their capacity was set up from 1987 to1994, typically with strong local support and participation, even though conditions were not very favourable at that time (e.g. need to negotiate tariffs with regional energy distributor). From 1998 on cooperatives could take advantage of favourable tax schemes but at the same time the demand for 'clustering' of wind turbine sites (fewer larger ones) rose, which turned out to be difficult for them as it required an increase in investment capital and increased the complexity of project development.

Concerning the role of cooperatives for the development of wind energy in the Netherlands Agterbosch et al. (2004) note that in terms of installed capacity, cooperatives have only played a minor role. Nevertheless they also suggest that cooperatives may have been *important catalyst actors* due to their promotion and lobbying activities and due to their perseverance in economically less attractive periods.

Small private investors in many ways faced similar problems to cooperatives (need to negotiate tariffs with regional energy distributors, later the demand for 'clustering'). Nevertheless, the *liberalisation of the energy market* in the late 1990s together with landownership and the *formation of umbrella organisations* eventually boosted their implementation capacity (most important entrepreneurial group in terms of installed capacity around 1999-2002, see graphs on p. 2052).

Agterbosch, Meertens and Vermeulen (2009) explore the social and institutional conditions in the process of planning wind power schemes, especially with respect to local social conditions. They argue that a formal positive policy framework can be neutralized by negative social conditions (NIMBY syndrome[1], e.g. in case of a large utility company planning a wind power installation), but also positive social conditions can compensate for a negative public policy framework (local capacity building, open deliberation, shared economic interest in case of small private investor).

In a similar vein *Wolsink (2000)* challenges the conventional view that the public in general supports wind power but objects to wind power development in their neighbourhood ('NIMBY

[1] NIMBY: 'Not In My Back Yard', i.e. referring to local opposition to an installation based on concerns over local disturbances (e.g. noise, visual disturbance, etc.)

syndrome'). He illustrates his argument by describing developments in Dutch wind energy policy (largely top-down) and argues for creation of more 'institutional capital', i.e. more open and collaborative approaches in planning. Nonetheless, he does not specifically mention cooperatives as such.

Breukers and Wolsink (2007) compare wind power installation achievements in the Netherlands, England and the German state of North Rhine Westphalia (NRW), thereby also providing background information on Dutch wind energy policy and its implications for local ownership models. They find that Dutch policy in general has been very volatile. In the first half of 1990s independent power producers needed to negotiate the remuneration price with regional energy distributors for each installation. Later independent power producers could make use of tax exemptions on renewable energy production and also profited from the end of regional monopolies of energy distributors.

In terms of spatial planning, Breukers and Wolsink note that local ownership (by farmers) was put at an advantage, since a pro-active decision is needed by the municipality for permission procedures and farmers were more acquainted with local social networks. Also, from the late 1990s locally owned projects increased 'as an unintended consequence of liberalisation' (p. 2747). Nevertheless they see a failure of Dutch grassroots initiatives to become forerunners in wind energy in the Netherlands, hardly exerting any influence on policy choices.

Summary – country case Netherlands

- **Local ownership** has also played an important role for wind power implementation in the Netherlands, mostly in the form of small private investors (mainly farmers). Wind power policy for a long time was rather unfavourable for small locally based wind power projects but has (unintentionally) become more supportive in the course of the **liberalisation of the energy market** in the late 1990s (Agterbosch et al., 2004, Breukers and Wolsink, 2007).
- In contrast to small private investors cooperatives (founded in late 1980s / early 1990s) have only been of **minor importance** in terms of installed capacity. In later years, the increased competition and increased scale of wind power projects has been difficult for them to handle. However, it has been suggested that they may have been important **catalyst actors**. (Agterbosch et al., 2004)
- Using case studies from the Netherlands some authors have challenged the concept of the 'NIMBY syndrome' in relation to wind power. These authors highlight the importance of **local social conditions** and emphasise the **positive effects** of local ownership and/or local involvement in planning and local acceptance (Agterbosch et al., 2009, Breukers and Wolsink, 2007, Wolsink, 2000).

2.3 UK

In their comparison of wind power installation achievements in the Netherlands, England and the German state of North Rhine Westphalia (NRW) *Breukers and Wolsink (2007)* also provide some background information on the situation in England. They describe an early policy choice to focus on large scale applications and a support system that was in general rather volatile. Furthermore, they point to the virtual absence of any grassroots initiatives in the area of local energy generation in 1970s and 1980s. The early liberalisation of the energy market in the early 1990s, based on the 'Non Fossil Fuel Obligations' and later the 'Renewables Obligations', made companies with strong financial backing (often subsidiaries of incumbents in the energy sector) also invest in wind power. For smaller companies it was more difficult to become involved in wind power projects.

Toke, Breukers and Wolsink (2008), also comparing wind power developments in several European countries, similarly highlight the *dominance of corporate ownership* of wind power in the UK. They suggest a general link between the spread of citizen-led ownership models in wind power in Europe to the existence of tradition of local energy activism and anti-nuclear movement in 1970s and 1980s and offer the weak tradition of energy activism in the UK as a possible explanation for the low number of wind power installations based on local ownership.

However*, Toke (2005)* also argues that commercially sized community wind power projects are desirable and also feasible under the 'Renewables Obligation' (RO) policy in the UK and should be encouraged and supported. In his view issues of ownership and size have become falsely linked because in Denmark larger projects typically are owned by utilities while smaller projects typically are owned by cooperatives or farmers – due to original legislative restrictions on extent of ownership for individuals. However, 'few farm owners have felt confident enough to invest much time, effort and their own money into developing their own wind power projects' (Toke, 2005, p. 303). Toke (2005) argues in favour of local ownership of wind energy projects as a means of increasing public acceptance and as means to give returns to 'ordinary people'. Furthermore, he provides two examples of commercially sized community wind projects in England and Wales, one of them in the form of a cooperative.

Bolinger (2001) describing community wind ownership schemes in different countries, notes a *number of barriers to community wind* energy projects in the UK, including the administrative burden to participate in the 'Non-Fossil Fuel Obligation' scheme (predecessor of the Renewables Obiligation scheme), the spillover of negative sentiments towards large-scale wind projects to community initiatives as well as the absence of tax incentives and capital investment subsidies. Furthermore, he points out that the UK does not have any

specific cooperative law. Nevertheless, he draws attention to other legal structures available for participatory wind power projects and describes two of them (industrial and provident society, public limited company) in more detail. At the time of writing, only two examples of community wind existed in the UK, one in each of these two legal forms..

Walker (2008) provides a review of experiences with community owned renewable energy technologies (not only wind power) in the UK. He points out that since 2000 government support has been available for 'community energy' and that many different kinds of projects have been developed under this label. This includes completely community owned projects as well as different forms of co-ownership with the private sector. Also different legal forms have been chosen, such as cooperatives (e.g. Baywind), community charities, development trusts (esp. in Scotland) or commercial projects with shares owned by a local community organisation. Furthermore, Walker (2008) points to the frequent distinction between communities of interest and communities of locality.

As *incentives for community ownership* of renewable energy technologies Walker (2008) lists local income and regeneration, local approval and planning permission, local control, lower energy costs and reliably supply, ethical and environmental commitment as well as easier load management through many small scale projects. Barriers to community energy lie in the many complexities (legal conditions, economic and technical viability, need for extensive liaison) thus creating a need for expert advice. Furthermore, community energy initiatives may face problems in grid connection and in the receipt of green energy certificates. Finally, 'funding often needs to be stitched together from many different sources' (p. 4402).

Concerning funding and support organisations, Walker (2008) points to the Community Renewables Initiative (CRI) that was established for this purpose in England but was not further funded from 2007. In Scotland, the Scottish Community and Household Renewables Initiatives (SCHRI) provides better framework conditions.

With regards to future developments, Walker (2008) highlights that 'a key question is the extent to which their success [frontrunner projects], however measured, can be replicated without initial dynamics of innovation or the involvement of key enthusiasts and social entrepreneurs' (Walker, 2008, p. 4403). Another possible problem might lie in the lack of a tradition of cooperative organisation in the UK. Introducing feed-in tariffs (in place of the Renewables Obligations) could stimulate community ownership in renewable energy technologies, but Walker (2008) emphasises that the transferability of this model to the UK has been questioned. However, he suggests that community co-ownership with commercial developers could become widespread practice in the UK.

Walker, Hunter, Devine-Wright, Evans and Fay (2007) try to explain why community-based localism has emerged as a *policy theme* in the UK since the year 2000. They find no 'grand

coordinating plan but instead a number of programs that have emerged relatively independently' (p. 67-71). They point out different instrumental rationales, such as increased acceptance of renewable energy installations (especially for large onshore wind farms), the wish to 'educate the public' about renewable energy, rural regeneration as well as the possibility to circumvent EU free market regulations (community approach enabling government to provide capital funding and market support). To a smaller extent, normative rationales such as communitarian and participatory principles are also present. In view of these different rationales the authors refer to Hajer's concept of a 'discourse coalition' (Hajer, 1995). They find that the openness of the notion of community ownership has enabled experimentation with different models of project management, ownership and distribution of benefits. 'Whilst therefore from a normative position we could be critical of the degree to which the meaning of community RE [renewable energy] has been stretched, pragmatically its malleability appears to have been purposeful and productive (…)' (p. 78). Additionally, they note as a possibility that – with reference to the transition management framework – a 'niche' may be created in which innovation in the social organisation of technology can occur.

Walker and Devine-Wright (2008) also focus on *discursive aspects* in relation to community energy and look at the way 'community energy' has been applied in relation to renewable energy projects in the UK (discursive politics). They find different interpretations of community energy, which may be based on a project's legal form (led by organisation without commercial interests), its physical rationale (e.g. involving public / community buildings), its involvement of local people in project development or on local people having a financial stake. Walker and Devine-Wright (2008) suggest a basic distinction between process and outcome dimension (who is concerned with developing and running project vs. who is the project for and how is it spatially and socially distributed? p.497/498). The authors provide a slightly more critical discussion of this interpretative flexibility than in Walker et al. (2007) and note that labelling a project as 'community energy' if the benefits are not shared by local people can also create resentment.

Summary – country case UK

- Traditionally, the UK (in particular England) has seen very **little citizen- or community led initiatives** in the area of renewable energy technologies. Especially in the area of wind power this has been attributed to an energy policy that has been very much in favour of large scale installations and corporate ownership and to the absence of a strong alternative energy movement (Toke et al., 2008, Breukers and Wolsink, 2007). However, it has also been argued that commercially sized community wind power should be feasible under the given legislative framework

(Toke, 2005).

- Since 2000 **government support** has been available for community energy projects. Projects carried out under this label vary widely in terms of ownership structure, legal forms and forms of community involvement. However, funding was discontinued for a central funding and support programme in England, the Community Renewables Initiative (CRI) in 2007. The Scottish Community and Household Renewables Initiative (SCHRI) still is in place (Walker, 2008).
- Discourse analytic approaches suggest that a **variety of different instrumental policy rationales** are related to the notion of 'community energy'. On this basis it has been suggest that a 'discourse coalition' (Hajer, 1995) has emerged – various actors with (perceived) shared interests and common framings, but without fundamental agreement on deeper values. The malleability of the term may be viewed as an opportunity for experimenting with different forms of community-related renewable energy projects but also as a threat eroding any substantive meaning of the term (Walker et al., 2007, Walker and Devine-Wright, 2008).

2.4 Germany

General issues

Flieger and Klemisch (2008), arguing for an increasing role of energy cooperatives in the (German) energy system, call attention to the *historic relevance* of energy cooperatives in Germany, ensuring electricity provision in rural areas in the early 20th century. About 40 such cooperatives are still active today, most of them situated in Bavaria. They notice a 'modest renaissance' of the idea of energy cooperatives in the 1980s – initially in the area of wind energy, but meanwhile increasingly also in the area of photovoltaics (PV). Unlike the cooperatives in the early 20th century these new cooperatives usually adhere to explicitly political goals in relation to regional ties and new energy concepts. They also provide a number of examples of 'new' energy cooperatives in Germany, among them also 'bioenergy villages' ("Bioenergiedörfer") organised as cooperatives, as particularly integrative approaches.

Toke, Breukers and Wolsink (2008), in their comparison of institutional frameworks for wind power deployment in various European countries, point out that most of German wind power capacity is owned by so-called 'Bürgerwindparks' (citizen wind parks) and suggest that this has in fact improved the political profile of wind power. Furthermore, they relate the diffusion of citizen-owned wind farms to a tradition of local energy activism based on the anti-nuclear

movement (like in Denmark and the Netherlands). Feed-in tariffs introduced in Germany in 1991 have generally provided a favourable condition for wind power diffusion.

Specific legal forms / specific ownership and participation models

Enzensberger, Fichtner and Rentz (2003) provide a detailed description of the development of different *citizen participation schemes* in the area of wind power in Germany. They take on a largely instrumental view on such schemes, regarding them as an 'important vehicle to develop wind energy business to its present state of market maturity' (p. 191).

They point to different parameters for economic design options of renewable energy projects in general, including the financing scheme, the legal form, ownership models, sales channels (e.g. direct sales, feed-in, auto-consumption) and task distribution. With regard to the legal form they point out that the choice needs to take into account liability issues (in case of project failure) and also note that the choice of a particular legal form influences accessibility of capital sources. Furthermore, Enzensberger et al. (2003) differentiate between three types of local citizen investors, namely private individuals owning and operating renewable energy facilities, small private investors owning shares of a project within a cooperative and small private investors owning shares within a project developed by a professional project developer.

Before going into further detail on the specific legal and economic setup of wind power participation schemes, the authors also review *general strategic aspects* of local citizen participation in renewable energy projects. As advantages they list the possibility to overcome public objection, access to an additional equity source (cumulative strength of many small investors, lower profitability expectations, limited investment alternatives), a potential political leverage effect (local citizen support conducive to political support) and operational advantages (locals will report unusual events). On the other hand they see disadvantages in high transaction costs (need to involve many small investors), unfamiliarity of small private investors inducing consulting needs, risk aversion due to lack of entrepreneurial background and the limited possibility of making use of risk mitigating effects by distributing investment across several projects.

As specific *favourable framework conditions* for citizen participation in wind farms in Germany Enzensberger et al. (2003) name the introduction of feed-in tariffs (risk mitigating effect), the availability of loan capital at preferential conditions (Deutsche Ausgleichsbank and European Recovery Programme) and favourable characteristics of the German society. The latter includes sensitivity to environmental issues, a tradition of acting in political groups and associations, but also the fact that Germany is densely populated with people of sufficient financial possibilities to invest.

The authors then describe in some detail different economic structures and legal forms that are common in Germany (and Austria) for local citizen wind farms:

- GmbH & Co. KG:
  This can be viewed as a ‚proven concept' both in Germany and Austria (with almost identical legal structure in both countries). It consists of a private limited partnership (Kommanditgesellschaft / KG) with a limited liability company (GmbH) taking on the role of the 'full partner' within the private limited partnership.[2] Thus, no partner is left with full liability. Further advantages include tax effects (income tax rather than corporate tax applies), easy manageability due to separation between project management (GmbH, usually set up by project-initiating investors) and a larger number of limited partners (further investors). In Austria there is an additional possibility for locals to become involved as small private lenders. As disadvantages the authors point out the need for the creation of two companies for every wind farm, the prohibition of bundling of several companies, possible high efforts for the search for interested local citizens, the impossibility of re-investing revenues in new projects and the lack of risk mitigation via distribution of investment over several projects. The following to modifications have emerged as response to these disadvantages:
- Closed-end wind funds [only in Germany?]:
  This modification emerged in the 1990s. It still involves a GmbH & Co. KG but with a separation of project development and the marketing of shares.[3] Shares are standardised as financial products. The focus thus no longer is explicitly on *local* residents which can result in increased public objection. (Therefore often ensuring sufficient degree of local involvement.)
- Private investor-owned wind portfolio companies (Austria and Germany):
  This is a merger of several wind farm-operating partnerships to larger corporations (Aktiengesellschaft). As advantages the authors refer to synergistic potentials between individual projects, the transferability of company shares, an improvement of the overall risk structure and the possibility to exploit new investment options without creating a new company (just issuing new shares). The authors discern a rather low penetration of this model in Germany [as of 2003?] but deem it likely that further wind farm projects will follow in transforming in this way.

Finally, Enzensberger et al. (2003) also attempt to assess the role of local citizen models in wind power in different market stages. Differentiating between the phases of pioneering,

[2] A private limited partnership (KG) requires at least one partner with full liability and can further include additional partners with limited liability.
[3] The GmbH and Co. KG constitutes the closed end wind fund, an additional 'external' GmbH acts as project developer, but the GmbH in the GmbH & Co KG usually is a 100% subsidiary of this project development company.

market creation, growth, market consolidation and market saturation they discern a strong role for local citizen models in the first two phases (citizens as the only actors prepared to invest). During the growth phase citizen-financed projects still dominated but project development increasingly moved into professionalized companies. At the time of writing (2003) the authors observe an increasing entry of utilities in the wind sector as well as increasing competition and resulting concentration (market consolidation).

The authors also point to 'new' wind markets in Spain, France and Italy, where hardly any local citizen participation models can be found. As a possible explanation they suggest that preconditions (lower population density and available income for investment, lower environmental concerns) are less favourable but also that the 'vehicle' of citizen participation is not needed anymore because other investor groups are now available.

Bolinger (2001), describing community wind ownership schemes in different countries, also provides an overview of developments in Germany. As he notes, feed-in regulation, first introduced in Germany in 1991, has made wind power projects very attractive in general, in particular community wind energy projects. As of 2001, roughly three quarters of installed wind capacity was community-owned. Bolinger (2001) notes a certain 'commercialization' even within such citizen-led initiatives with a shift in ownership from individual small private investors (mostly farmers) to companies based on limited partnerships with mainly wealthy individuals as investors. He attributes this relative commercial nature of citizen-led wind power projects to strong financial incentive structures, attracting 'a different investor class - those motivated primarily by profits, rather than (or perhaps in addition to) environmental or community concerns' (p. 31).

Furthermore, Bolinger (2001) points out that shared ownership in the legal form of cooperatives is rare, as the GmbH & Co. KG-model (see also Enzensberger et al. (2003) above) is financially more attractive. Apart from tax advantages, the same limited liability company (GmbH) can serve as the full partner for several projects (only requiring the set up of a new private limited partnership (KG), which entails rather low costs), thus reducing start-up costs. According to Bolinger, participation as limited partner typically is not restricted to local investors in such a scheme, with locals usually only making up 20-30% of all limited partners.

The author also provides a detailed description of the development of feed-in and grid interconnection regulations in Germany (up to the time of writing). Furthermore, the easy access to loans for wind projects via the government owned 'Deutsche Ausgleichsbank' is noted.

Bettzieche (2009b nonacadem.) presents an overview of different legal forms in Germany for medium-sized PV installations set up by groups of citizens. He notes that important issues to

consider when choosing the legal form for a project include liability issues, tax issues as well as the possibility to pass on shares. A basic distinction can be made between capital companies (Kapitalgesellschaften), such as cooperatives, limited liability companies and corporations, and business partnerships (Personengesellschaften), such as private partnerships (gesellschaft bürgerlichen Rechts / GbR) and private limited partnerships (Kommanditgesellschaft / KG). Different taxing regulations apply for capital companies and business partnerships (corporate tax / income tax on individual earnings). Regulations differ as well with respect to the payout of dividends for different legal forms. Subsequently, the advantages and disadvantages of various legal forms are discussed:

- Corporation: Not well suited for citizen led PV installation due to administrative burden.
- Private partnership (GbR): Many examples of the use of this form for citizen-led PV installations exist. Advantages include an easy founding process. Disadvantages lie in the full liability of all partners and the inflexibility with regard to the entry and leaving of members.
- Limited liability company (GmbH): The limited liability constitutes an advantage, the higher administrative burden a disadvantage. The case is similar for limited private partnerships (KG).
- Cooperatives: This is increasingly used as the legal form for citizen-led PV installations. It has flexibility advantages, namely that an unlimited amount of projects can be realized and new members can enter without complications at a later stage. Furthermore, cooperatives can be organised democratically. However the higher administrative burden (compared to GbR) also constitutes a disadvantage here.
- Bonds (Anleihen) or participation rights (Genussrechte) constitute another possibility, however with the disadvantage that investors do not have any voice. Also an official (investment-)prospectus needs to be issued.

Bettzieche (2009a nonacadem.) describes the development of PV investment funds for small private investors in Germany. According to the author they have developed very well in the years 2007-2009, with an increasing number of parties offering investment opportunities. However, further development appear somewhat unclear due to possible alterations to the German feed-in regulation. Bettzieche (2009a) also diagnoses a trend towards larger installations (smaller ones being in general more costly) and observes an increasing number of institutional investors and utility companies as PV investors. Several initiatives are moving away from a traditional citizen-participation model and are turning into investment companies (usually as closed end funds). One individual is cited naming prospectus regulations (also

applying to private partnerships) as the reason why they converted to an investment company.

Like Bettzieche (2009b nonacadem.), *Rutschmann (2009 nonacadem.)* observes that citizen-led PV installations have so far usually taken the form of private partnerships (GbR) but also points to the increasing number of cooperatives emerging in this area. As advantages of cooperatives she refers to the possibility to realise an unlimited amount of plants, the lower administrative burden (compared to GmbH and Co. KG), the high identification potential due to self-management, the democracy principle and easy entry and withdrawal of members. Citing Burghard Flieger as an interviewee, however, she notes that the effort for the prescribed financial assessment (Rechnungsprüfung) is only worthwhile if a certain size can be reached. Minimal shares are generally kept low to ensure easy accession of members, e.g. between 100 and 1000 €.

Rutschmann (2009) provides a list of approx. 40 cooperatives active in the area of PV in Germany at the time of writing (full list, but not including housing cooperatives of which some also have set up PV installations). Some particular cases of PV cooperatives are briefly described, including one that is accessible exclusively to women (Windfang eG), one example of a cooperative founded in cooperation between a community (Aichstetten, Baden-Württemberg) and a regional utility company (EnBW AG), one example where employees of a company (Volkswagen AG) founded a PV cooperative and mounted the installation on the roof of the production workshop and one example (FairPlanet eG) initiating PV installations worldwide, including also developing countries.

Rutschmann (2009) notes that originally much time was necessary for generating the required knowledge, counselling and recruitment of members, but meanwhile the founding of new cooperatives can be realised much faster due to the existence of specialised support / intermediary organisations. Concerning the recruitment of members the author suggests that the process may be easier for 'professionally organised' cooperatives, e.g. in cooperation with a regional energy utility or regional bank, due to a higher degree of visibility.

Finally, a brief description of the essentials of the legal form of cooperatives (Rutschmann 2009, box on p. 82) is provided. It is also pointed out that renewable-energy-related cooperatives can also be found in the area of trade with components for installations and energy distribution and sales.

Summary – country case Germany

- Citizen-led renewable energy installations have become very **widespread** in Germany. In wind energy, a large amount of installed capacity is owned by 'Bürgerwindparks' (citizen wind parks) (Bolinger, 2001, Toke et al., 2008,

Enzensberger et al., 2003). Also **shared ownership** of PV installations has become popular. Historically, a number of energy cooperatives ensured electricity provision in rural areas in the early 20th century (Flieger and Klemisch, 2008).

- A number of favourable **framework conditions** for citizen-led renewable energy installations in Germany have been identified: The feed-in tariff system, a tradition of local energy activism as well as a general tradition of acting in political groups and associations, the availability of loan capital at preferential conditions as well as a sufficient number of people with sufficient financial possibilities to invest and a relatively high sensitivity to environmental issues (Bolinger, 2001, Toke et al., 2008, Enzensberger et al., 2003).
- Several authors have pointed out that the **choice of the legal form** has implications for a number of aspects, including liability issues, tax issues, the administrative burden entailed, flexibility with respect to the number of projects that can be realised and with respect to the entry and withdrawal of members and finally also the management / governance issues (e.g. democratic self governance in cooperatives) (Rutschmann, 2009, Enzensberger et al., 2003, Bettzieche, 2009b).
- The dominant legal form for 'Bürgerwindparks' is that of a GmbH & Co. KG. Due to some flexibility restrictions (bundling of companies / projects, reinvestment of revenues in new projects) some alterations of this models have occurred, in particular closed end wind funds and private investor owned portfolio companies (corporations with shares owned by citizens) (Enzensberger et al., 2003). For shared ownership of PV installations private partnerships (GbR) are the most widespread model. Recently, however, an increasing number of cooperatives has also been founded (higher flexibility in number of projects and member entry / withdrawal) (Rutschmann, 2009, Bettzieche, 2009b). Furthermore an increasing number of PV investment funds are also being offered (Bettzieche, 2009a).
- Concerning development processes over time, two partly diverging trends appear to be discernible: On the one hand an increasing number of **'real' cooperatives** is emerging (i.e. shared ownership in the legal form of a cooperative), especially in the area of PV, often with explicit political goals related to local/regional ties and new energy concepts (Flieger and Klemisch, 2008, Rutschmann, 2009, Bettzieche, 2009b). This trend is further supported by the formation of specialised support organisations (Rutschmann, 2009). On the other hand, in the area of wind power, a trend towards **purely commercially oriented projects**, increasing concentration and a loosening of the ties to *local* participation can be observed (Enzensberger et al., 2003). However, also in the area of PV investment funds (with little or no regional

ties or political goals) are gaining in importance (Bettzieche, 2009a).

- It has also been noted that – compared to Denmark (and Sweden) – citizen-led wind energy projects in Germany were much more motivated by profitability expectations from the start. This may be attributed to strong financial incentives attracting a group of investors for which environmental and community motives played less of a role (Bolinger, 2001).

2.5 Austria

Madlener (2007) discusses framework conditions for the diffusion of rural biomass district heating (BDH) systems in Austria, typically set up in the form of farmers' cooperatives. Furthermore, the author provides a description of the diffusion of BDH systems in the province of Vorarlberg and a case study of a BDH plant in Rankweil (Vorarlberg).

As Madlener (2007) notes, rural BDH systems emerged in the mid 1980s in Austria and constituted a real innovation at that time. He argues that they can be seen as an outcome of both local initiatives and public policy made. The original policy goal in the support of BDH systems was related to the support of agriculture and forestry (additional income generation for farmers via BDH plants). Policy support consisted of capital grants and soft loans for agricultural cooperatives (lower grants for commercial operators) as well as the provision of technical performance guidelines and seminars.

Important actors included *local promoters* of BDH projects (typically 'well respected residents of village that are personally highly motivated' (p. 1995, quoting Rakos 2001), agents acting in each province as 'focal point' providing advice and general support and planners and installers. Furthermore, local and regional politicians authorising grants and the scientific community pushing the technological state-of-the-art played a decisive role. As many grants were only accessible to farmer cooperatives, utilities created new forms of cooperation with farmer cooperatives.

As Madlener (2007) concludes, 'the Austrian experience of a rapid diffusion of BDH plants was the outcome of a combination of high capital grants offered by several funding sources, local initiatives rooted in a mix of environmental concern and self-interest of forest-owning farmers, and the build-up of know-how and networking among the main stakeholders involved' (p. 2006).

[Remark: A large part of the material presented in this paper concerning the Austrian case in general (i.e. not specifically Vorarlberg and not specifically the case study in Rankweil) appears to be based on *Rakos (2001)*.]

Weiss (2004) discusses the diffusion of biomass district heating systems in Austria from an 'innovations systems' perspective. He suggests that it has developed from a regional innovation system dominated by a diversity of regionally based actors in the phase of technology development to a sectoral innovation system dominated by actors from the agricultural / silvicultural sector in the diffusion phase. He also notes the dominance of farmer cooperatives as owners of BDH systems, farmers thereby being able to earn additional income from wood residues that would otherwise be hard to sell. As Weiss (2004) points out ownership patterns of BDH plants developed quite differently in neighbouring countries, with municipalities typically operating such plants in Bavaria and consumer cooperatives emerging in South Tyrol.

Concerning more recent developments in the area of wind farms, *Enzensberger et al. (2003)* also provide some information on common citizen participation schemes in Austria, as they are in many ways similar to German models. In particular the GmbH & Co. KG model as well as private investor owned wind portfolio companies can also be found in Austria (see section 2.4 for details).

Summary – country Case Austria

- In contrast to the previously covered country cases, locally owned renewable energy installations can mainly be found in the area of **rural biomass district heating systems** in Austria. Typically they are organised as farmers' cooperatives. In some instances utilities also have formed partnerships with farmers' cooperatives (Madlener, 2007, Weiss, 2004, Rakos, 2001).
- More recently, citizen participation models have also appeared in the area of wind power, typically organised as a GmbH & Co KG (hybrid of limited private partnership and limited liability company) or as private investor owned wind portfolio companies in which citizens can buy shares (Enzensberger et al., 2003).

3 Institutional framework conditions (community wind)

This section presents an overview of literature on institutional framework conditions related to the establishment of ***community wind power*** *in Europe (and partly in the US). The emphasis on community wind mirrors the attention that has been given to this particular area in the literature but should also help to draw a broader picture of the conditions enabling or averting community projects.*

Bolinger (2001) providing an overview of community wind power names 'five primary factors' which from his view have enabled community ownership in Europe, especially in Denmark, Sweden and Germany. *Feed-in laws* create a stable, profitable and almost unlimited market. Furthermore they can be accessed at low transaction costs. Possible *tax advantages* include tax free generation, refund of energy and/or CO_2 taxes and favourable depreciation rules. Depreciation rules have enabled farmers to defer taxation on their other farming profits in Denmark and Sweden. In Germany limited partners can write off depreciation expenses against other forms of income. *Standard interconnection agreements* require utilities to interconnect small wind projects to the grid, according to a pre-determined set of rules and further reduce uncertainties. The *presence of a wind turbine manufacturing base* further spurred community wind power development in Denmark and Sweden, as representatives of turbine manufacturers often promoted or initiated community wind projects. Finally, Bolinger (2001) also finds a *familiarity with cooperative ownership structures* to be conducive to community wind development (history of agricultural cooperatives in Denmark, history of joint ownership of public goods in Sweden). Further details on the presence and development of these factors in the countries under focus are provided in the manuscript.

In a paper on the potentials of *'European-style community wind power'* in the US *Bolinger (2005)* names similar factors as historical drivers for community wind power in Northern European countries (feed-in laws, standardized grid interconnection rules, tax regulations, presence of a wind manufacturing industry, ownership restrictions (Denmark) and a push towards community wind due to a number of permitting denials (UK)). Bolinger (2005) points out that less favourable framework conditions exist in the US as federal support for wind power consist mainly of tax incentives that are only attractive for commercial players. However, at the level of individual states (Minnesota, Wisconsin, Iowa, Massachusetts) there has been an effort to enable community wind, e.g. via the development of innovative co-ownership structures involving small local investors as well as commercial players. These ownership structures are designed to allow for making use of the federal tax incentives while allowing for a considerable extent of local ownership. Further support that has been available from individual states includes a production incentive per kWh of

produced electricity for 10 years (Minnesota) or the establishment of development services for community wind in Massachusetts.

Breukers and Wolsink (2007) compare wind power installation achievements in the Netherlands, England and German state of North Rhine Westphalia (NRW). They argue that facilitating local ownership and institutionalising participation in project planning can be beneficial for the implementation process and conclude that this has worked better in NRW than in the Netherlands and England.

The comparative analysis of the process of institutional capacity building in the countries under focus looks at developments in three relevant policy domains (energy policy, spatial planning and environmental policy) and at the formation of a policy community for wind power (e.g. role of grassroots initiatives in mobilising political support). The concluding discussion highlights three aspects:

- *Mobilisation of capital and financial support*: The feed-in system in NRW (Germany) has been very effective, especially in combination with other support programmes that allowed a diversity of actors to become involved (in particular also small, independent initiatives). In contrast, in the Netherlands and England policies have favoured large players (such as utilities).
- *Institutional capacity building*: The authors point to a relatively successful development in NRW where developments started locally and support was mobilised bottom-up, thereby avoiding local opposition. However they also point to the emergence of opposition in recent years due to the prioritising of wind turbines in spatial planning. In England and the Netherlands the early policy focus on large-scale applications was less successful. However, the authors also point to an increase of wind power implementation as an 'unintended consequence' of liberalisation (i.e. 'weak capacity building […] did not completely prevent developments at a later stage' p. 2748)
- *Local planning* is described as the 'weak link', which has not been formally institutionalised in any of the countries under consideration. In NRW inclusive approaches only resulted from the types of projects realised.

Toke, Breukers and Wolsink (2008) compare Denmark, Spain, Germany, the Netherlands, England/Wales and Scotland in terms of institutional factors relevant for wind-power deployment. They point out that the quantity of wind resources is not a sufficient explanatory factor for differences in the amount of installed capacity in the countries under focus and discuss four institutional variables that are found to be relevant. Next to planning systems, systems of financial support and landscape protection organizations this also includes local ownership patterns.

Concerning planning systems the authors point to possible problems if planning decisions are taken at different (higher) levels of governance than the actual implementation and therefore argue for more collaborative approaches in planning. With respect to systems of financial support Toke et al. (2008) note the importance of consistent and generous support for wind power, which has been available in Denmark, Germany and Spain but lacking in the Netherlands and the UK. Furthermore, they point out that the design of financial incentive structures affects the degree to which grassroots initiatives can also be supported (discussion of feed-in vs. 'market based' instruments earlier in the paper but no explicit mention of feed-in system being more accessible to grassroots).

In terms of local ownership structures Toke et al. (2008) contrast Spain and the UK, dominated by corporate players, with Denmark, Germany and the Netherlands, where local ownership is quite common. They relate this to the existence of a tradition of energy activism and the anti-nuclear movement. Furthermore, the authors point out that wind power deployment has not been impeded by a lack of local ownership in Spain, as anti-wind farm networks and concerns over landscape protection are much weaker. However, for the UK they conclude that local ownership of wind power could be conducive to public acceptance of wind power.

Markard and Petersen (2009) analysing ownership structures in offshore wind power for Denmark, the UK and Germany, point out that electric utility companies as well as companies from the oil and gas industry dominate the scene while small investors only play a minor role. They note that this ownership pattern can be found irrespective of ownership patterns in onshore wind in the respective counties. They attribute this to specific technological characteristics of offshore wind (larger wind parks and correspondingly higher capital costs and also higher risks) but also to regulation effects favouring particular investors.

Olesen et al. (2004) provide an overview of the Danish history of community-based wind energy development, organised along different institutional framework conditions relevant to wind power deployment:

- *Legal system*: Relevant legislation aspects in Denmark include siting, technical aspects, taxation (favourable rules for small private investors), accepted ownership forms (originally restrictions on shares of private investors, see section 2.1) and feed-in regulation (prices, regulation on grid connection)
- *Financing*: Several banks have included financing of wind turbines for cooperatives / single investors in their standard portfolio, e.g. providing loans to finance a wind turbine without assessing the private economy of the buyer if the overall project is

trusted (shares / wind turbine act as security). Also insurance against lower electricity production of wind turbines is available from some insurance companies.

- *Planning procedures*: In 1994 all municipalities were asked to designate sites for turbine groups, since 1999 some national criteria for the siting of turbines apply and competence of wind power planning was given to counties' regional planning. The authors view this as a success for spatial planning but also point out that it has created more local opposition because it is now easier for professional investors to be involved.

Miles and Odell (2004) provide further details of spatial planning issues in Denmark in relation to wind power.

The following box not only summarises the most important conditions mentioned above, but also includes relevant points from Agterbosch et al. (2004), Agterbosch et al. (2009) (see section 2.2) and Enzensberger et al. (2003) as well (see section 2.4).

Summary – institutional framework conditions

- A number of papers and reports exists dealing with institutional framework conditions for wind power implementation, often with a specific focus or emphasis on institutional conditions for community wind projects. Indeed, some authors have pointed out that regulatory frameworks for wind power do not provide a neutral playing field for different actors but also influence the installation capacity of different players (Agterbosch et al., 2004, Markard and Petersen, 2009).
- In terms of policy issues, a number of authors point to **feed-in regulation**, **standardised rules for grid-connection** and **tax advantages** as factors that have been conducive to the development of community wind projects in countries such as Denmark, Germany and Sweden (Bolinger, 2005, Bolinger, 2001, Breukers and Wolsink, 2007, Olesen et al., 2004)
- The mobilisation of **sufficient capital** and **financial support** has been emphasised as an important issue. Apart from feed-in regulations, contributions towards this goal can also come from preferential conditions for the availability of loans and insurances (Olesen et al., 2004, Enzensberger et al., 2003) as well as by specific forms of co-ownership between commercial actors and local private investors (Bolinger, 2005). Furthermore Enzensberger et al. (2003) also refer to socio-demographic factors such as the presence of sufficient people with sufficient financial possibilities to invest.
- Some authors also have pointed to the importance of **cultural factors**, especially the

existence of an alternative energy / anti-nuclear movement (Toke et al., 2008, Breukers and Wolsink, 2007, Enzensberger et al., 2003) and familiarity with cooperative ownership structures (Bolinger, 2001).

- **Spatial planning** is referred to as an important factor for wind power implementation in general (not specifically community wind) by several authors (Toke et al., 2008, Breukers and Wolsink, 2007, Miles and Odell, 2004, Olesen et al., 2004). There are some indications based on experiences from Denmark and Germany that supporting wind power development via preferential spatial planning rules (e.g. municipalities obliged to designate suitable areas) can in fact trigger increased opposition and some authors have argued for more participative planning approaches on this basis (Toke et al., 2008, Breukers and Wolsink, 2007, Olesen et al., 2004)
- Finally, **local ownership** is sometimes seen as a favourable framework condition in itself that can counteract resistance to wind power deployment (Wolsink, 2007, Agterbosch et al., 2009, Toke et al., 2008, Breukers and Wolsink, 2007, see section 5 for further details).

4 Interactions at the micro-level

Walker, Devine-Wright, Hunter, High and Evans (2010) examine the role of *interpersonal and social trust* (trust in institutions) in community energy projects in the UK. The authors point to previous arguments in the literature conceiving of trust as both, a necessary characteristic and a potential outcome of cooperative behaviour. Furthermore, they note that in the case of community energy projects it has also been argued that they can enhance wider societal trust in renewable energy technologies. While the empirical work (case studies) conducted by Walker et al. (2010) generally confirms the importance of trust in community energy projects, they also critically question simplistic and rose-coloured notions of 'community'. As they point out, communities can also be exclusionary, or can change and fracture over the course of time.

The empirical material is derived from six community energy projects in the UK. Questionnaires distributed to local residents show that high levels of trust in project organisers correlate with the feeling that the project has only gone ahead because of community support and involvement, with the perception that the project has brought the community together and with the feeling of having been able to contribute to / to influence the project. Quite different levels of trust in project organisers can be found in the six case studies.

The authors then proceed to contrast two cases with particular high / low levels of trust in project organisers. Contrasting characteristics that may account for these outcomes to a certain extent include the implementation of unobtrusive vs. obtrusive technology (heat pump / wind turbines) and an even distribution of benefits (village hall restoration) vs. concentration of benefits on a small group of individuals (three farmers implementing wind turbines). In both cases interpersonal trust within the leading group was present, but in the 'negative' case there was high distrust between the leading group and some parts of the rest of the community. Here a strategic discourse of 'insiders' and 'outsiders' emerged with both sides mutually describing others as outsiders to community. Furthermore, the leading group (three farmers) was accused of illegitimately using the term 'community' for the wind energy project.

The authors thus suggest that 'Whilst trust may therefore be functional for the development of community RE and potentially can be enhanced by the adoption of a community approach, this cannot be either assured or assumed under the wide diversity of contexts' (p. 2655).

Hinshelwood (2001) looks at the process of project development of a community wind energy project in Wales, addressing in particular the (potential) role of external agencies / support organisations. The idea for the project was triggered by a LA 21 process conducted by the local authority and taken up and pursued further by a committed group of interested individuals. Hinshelwood (2001) notes that maintaining control over the project was a crucial

aspect as different external organisations (a local RE company, a charitable RE organisations) tried to enrol them in their agendas which would have meant compromising some of their ideas. The author therefore sees a need to actively seek appropriate support and make acceptable compromise rather than respond to inappropriate offers. Recommendations on how external organizations can support community groups include support in access to relevant information, training, logistical support, support in developing funding strategy etc.

Rakos (2001), describing the introduction of biomass district heating systems in Austria (to a large extent owned by agricultural cooperatives) notes that the success of this technology diffusion process was based on a bottom-up movement, but that also conflicts at the local level occurred during the implementation process. As he points out, public perception was particularly critical in order to gain sufficient customers. A survey revealed that the main reasons for residents to connect to biomass district heating systems were environmental protection, enhanced heating comfort but also support of local farmers. Rakos (2001) notes that 'successful local promoters are typically well respected young residents of the village that are personally highly motivated and that manage to create a consensus in the whole village to realise the project' (p. 5). Also, 'focal points' established at the level of individual provinces were important actors, providing advice to developers of new projects. (They were established at the agricultural chamber, within state-administration, within existing energy agencies or independently.) However, consultants were only trained in technical and economic issues and were not able to give appropriate advice on local conflicts. Nevertheless, Rakos (2001) concludes that the community aspect has been an important driver of biomass district heating network projects and also an opportunity to enhance community cohesion.

Weiss (2004), also describing the diffusion of biomass district heating systems in Austria points to the importance of convincing the mayor and the local council of a biomass district heating network project, as public buildings typically were needed to ensure a sufficiently large base-load demand. Furthermore, he also emphasises the importance of public relations in order to acquire businesses and households as further clients of the plant. Weiss also notes that sometimes farmers were not viewed as competent and could only acquire customers by cooperating with the regional utility company.

Karner, Rößl and Weismeier-Sammer (2010) investigate possible models of Public Citizen Partnerships (PCPs) in Austria in which municipalities and citizens collaborate to fulfil particular communal tasks. The focus is not on energy issues but rather on the fulfilment of communal tasks in the social sphere, such as childcare, care for the elderly or running

recreational facilities. Nevertheless, the study points to important aspects for cooperative activity at the local level that can also be of interest when investigating energy cooperatives. In particular possible cooperation types between the municipality and engaged citizens are outlined, depending on who initiates and who controls a PCP (municipality / citizens or both). The authors also highlight various problems and conflicts that might emerge over the issue of control. In particular the fear of losing control may prevent the municipality / the mayor from allowing citizens to become involved in the actual design and management of a PCP or even from engaging in any sort of PCP in the first place. Furthermore, PCPs may become regarded as associated with a particular political party, which can hamper interest in participation on the side of citizens. The authors also discuss the importance of social capital for the realisation of PCPs. Among other things, they note the importance of 'citizen promoters' of PCPs that push the project at the local level. They also note that the existence of a variety of associations in a community is beneficial for the realisation of PCPs.

Summary – interactions at the micro level

- Research on processes of social interaction around energy cooperatives / community energy projects has focussed on relationships between project organisers and the rest of the community (Walker et al., 2010, Weiss, 2004, Rakos, 2001) and has also emphasised the important role of specialised (regional) support organisations (Hinshelwood, 2001, Rakos, 2001).
- It has been pointed out that **trust** is an important condition for implementing locally owned renewable energy projects and a potential outcome of such a project (Walker et al., 2010, Rakos, 2001). Nevertheless, trust between local residents cannot be assumed as given. It may depend on factors such as the distribution of profits within the community, the obtrusiveness of the technology involved but also on previous conflicts or animosities within the community (Walker et al., 2010).
- In the case of biomass district heating systems, **local support** is particularly important, as local residents also constitute the potential customers of the plant (Weiss, 2004, Rakos, 2001). In some cases in Austria a lack of trust in the competencies of local farmers led to co-operations with regional energy utilities (Weiss, 2004).
- As it has been demonstrated for the case of local cooperatives fulfilling tasks in the social sphere (child care, etc.), the **relationship between the municipality** – in particular the mayor – **and active citizens** also is of crucial importance. Problems may arise from conflicts over control between the municipality and citizen groups (Karner et al., 2010).

5 Local ownership of renewable energy technologies and public acceptance

Attitudes towards *potential* community based projects

Barry and Chapman (2009) argue for the development of small-scale wind installations in addition to current large-scale developments in New Zealand, explicitly linking small-scale wind power to the possibility of community ownership (lower capital costs thus more affordable to smaller investors). They present a survey conducted among rural landowners in two regions of New Zealand covering attitudes towards large-scale and small-scale wind power development. In accordance with findings from other international studies (as the authors note) results indicate that landowners are significantly more positive towards small-scale wind.

Furthermore, the authors also discuss potential benefits of community ownership of wind power. Apart from increasing public acceptance they also refer to community ownership as an additional source of capital, as a contribution towards distributed generation benefits (reducing transmission costs / losses) as a means for the farming sector to offset its high levels of greenhouse gas emissions, as a means to strengthen and diversify local, rural economies and as a means of creating more competition in the electricity generation sector in New Zealand.

Devine-Wright (2005) investigates support for local involvement in relation to a planned community based wind energy project and the socio-demographic factors relevant to these beliefs (no indication whether the planned project has been realized). He finds a high level of support for wind energy development embedded in the local community (specifically for development in partnership with local community, local use of energy produced, profits put back into local community). Slightly lower levels of support were present for local ownership, but still a majority of respondents were in favour of such a model. Only weak socio-demographic effects could be found.

[Remark: Appears to be the same community project as described by Hinshelwood (2001).]

Rogers, Simmons, Convery and Weatherall (2008) provide an exploration of the attitudes of a small community (56 households) in the lake district in England towards a potential community energy project. Findings show that support for community energy project was more widespread than the desire to participate and indicate popularity of low-level participation. Most frequent reasons for people not wanting to participate include lack of time, interest or ability. Expected benefits can be grouped into social, environmental and economic aspects. Social aspects are strongest, in particular the aim to strengthen the community. At

the same time some people are skeptical whether a community energy project could be realized, given the existing rather weak community ties.

Attitudes towards *actual* community based projects

Maruyama, Nishikido and Iida (2007) present a study on attitudes towards and motivations for (non-)participation in three community wind projects in Japan (Hokkaido, Aomori and Akita). Citizens could participate via local funds but also via a 'Japan funding' scheme which enabled participation from across the country. The authors point to the importance of a sense of ownership which is provided for in these examples by the possibility for small investors to have their name inscribed on the tower.

The evaluation of a survey asking for the reasons for investment and non-investment via factor analysis reveals three relevant aspects influencing engagement, namely an 'environmental movement factor' (desire to contribute to a sustainable energy system), an 'economic incentive factor' (expectation of revenues) and a 'commitment factor' (sense of ownership, support of concept of citizen ownership). The relevance of these factors varies between different investor groups for different community projects. Overall the authors conclude that wind power offers incentives for different actors that are mutually complementary.

Warren and McFayden (2010) present a questionnaire based case study comparing attitudes of residents around a community owned and a developer-owned wind farm in Scotland. Results show positive attitudes in both communities, but more strongly positive ones around the community owned wind farm (only descriptive statistics, no statistical testing).

As the authors note, a 'NIMBY approach' is too simplistic to explain opposition to wind farms. Apart from the visual impact other factors to be considered include local perception of a wind power project's economic impact, the national political environment as well as institutional factors. Furthermore, they point out that apart from classical legal/economic ownership, a sense of ownership is also important.

Apart from increased public support Warren and McFayden (2010) refer to a number of further advantages of community involvement: fewer planning refusals, access to new sources of investment capital, electricity price stability, and harnessing the benefits of distributed generation. However, they also alert to a number of disadvantages, such as reduced economies of scale and a greater administrative burden.

Finally, the authors point out that in early wind-power developments the small size of early turbines matched community-ownership models well (Denmark). In their view, Scotland missed this window of opportunity as 'the wind industry has outgrown community involvement' (p. 211).

Olesen Maegaard and Kruse (2004), referring to an example of a rural municipality in Denmark that realised a community owned wind power project, point out that no local conflicts arose in this case. In fact an investigation showed increasing support the closer people lived to the windmills. The authors explain this by their economic participation. However, the authors see the question of conflict becoming urgent again in Denmark since the turn of the century, due to government incentives for taking down of old wind turbines and replacing them by fewer larger ones ('re-powering development'), often with a shift in ownership patterns away from local residents. With respect to the integration of wind power in spatial planning Olesen et al. (2004) see a success for spatial planning, but also criticise the current planning regime for making things easier for larger investors, thereby once again fuelling local opposition to wind power.

Local participation and ownership as institutional capacity building

Breukers and Wolsink (2007), comparing processes of institutional capacity building for wind power in the Netherlands, England and the German state of North Rhine Westphalia pay special attention on local planning contexts and problems with local social acceptance. They point out that previous research has indicated negative attitudes to wind power to be based on perceived visual impacts but point out that other factors such as discontent with decision-making processes and the management of facilities may also play a role.

Breukers and Wolsink (2007) consider local participation in planning procedures to be the 'weak link' in institutional capacity building for wind power, as it has not been institutionalised in any of the countries / provinces studied. Inclusive approaches in North Rhine Westphalia resulted from specific types of projects (citizen-led installations) rather than from institutionalised procedures. They also note that, while opposition to wind power has generally been low in North Rhine Westphalia due to the dominance of citizen-led projects, introducing a privileged position for wind power in spatial planning (municipalities obligated to designate areas for wind power development) has triggered some resistance.

Apart from arguing for community ownership and increased local participation in planning as a means for creating public acceptance, they also point to epistemic and normative grounds for fostering such approaches (relevant stakeholders bring in their knowledge, enhancement of democratic legitimacy). Furthermore, they note the local economic benefits of community ownership.

As has already been noted in section 2.2 (country case Netherlands) other authors have also challenged the concept of the 'NIMBY syndrome' in relation to wind power, highlighted the importance of local social conditions and emphasised the positive effects of local ownership and/or local involvement in planning and local acceptance (Agterbosch et al., 2009, Wolsink, 2000). Similarly *Toke, Breukers and Wolsink (2008)* note that 'a clear distinction must be

made between general attitudes towards wind power and the behaviours towards specific wind power schemes' (p. 1136) and that investors from outside of a community may be met with mistrust. Furthermore, the following summary also refers to points made by Enzenberger et al. (2003) and Bolinger (2001) (see sections 2.4and 3 respectively).

Summary – local ownership of renewable energy technologies and public acceptance

- With rising local opposition to the installation of wind farms, attention has turned towards **local participation and ownership** as a means to reduce such opposition.
- Some authors have investigated attitudes of people towards ***potential*** community-based wind energy projects in countries which have traditionally favoured large-scale commercial wind power installations (Devine-Wright, 2005, Barry and Chapman, 2009, case studies in UK and New Zealand respectively). Results indeed point towards high levels of support for small-scale, community based wind power. However research on potential renewable energy community projects in the UK also indicates preferences for low-level forms participation e.g. higher support for a partnership with the local community rather than for community ownership or reservations towards investing too much time (Devine-Wright, 2005, Rogers et al., 2008).
- Research on the acceptance of ***actual*** community based wind power installations also suggests a favourable influence on public acceptance (Olesen et al., 2004, Warren and McFadyen, 2010). Furthermore, some authors have pointed to the importance of a *sense of ownership*, rather than ownership in a strictly legal sense (Maruyama et al., 2007, Warren and McFadyen, 2010).
- **Local participation** in planning and/or **local ownership** has also been highlighted as an important aspect of institutional capacity building for wind power implementation. Various authors have challenged the 'NIMBY approach' and pointed out that local opposition to wind power not only stems from aesthetical objections but also from objection towards specific forms of decision making and economic benefit distribution (Wolsink, 2007, Agterbosch et al., 2009, Toke et al., 2008, Breukers and Wolsink, 2007).
- Apart from the instrumental rationale of reducing public opposition, especially in the case of wind energy, a number of further instrumental but also normative arguments have been put forward for local participation in / ownership of renewable energy projects. These include benefits from distributed generation, making use of an additional source of investment capital, harnessing the knowledge of additional stakeholders, political leverage effects (local citizen support conducive to political

support), operational advantages (locals reporting unusual events), strengthening and diversifying local economies and enhancing the democratic legitimacy of wind power projects (Breukers and Wolsink, 2007, Warren and McFadyen, 2010, Barry and Chapman, 2009, and see also Enzensberger et al. 2003 in section 2.5 and Bolinger 2001). Some authors also note some disadvantages of local or distributed ownership of wind energy projects, such as reduced economies of scale, higher transaction costs due to the large number of people involved and the limited possibility of making use of risk mitigating effects by distributing investment across several projects (Bolinger, 2001, Warren and McFadyen, 2010, Enzensberger et al., 2003)

6 Summary and Conclusion

This section both summarises important points from the literature review and draws particular attention to issues of interest for the further course of this research project. As a first step the table on pages 36 and 37 summarises and contrasts the individual 'country cases' reviewed in section 2. Of course, as different authors writing on different countries have emphasised different aspects of energy cooperatives in the respective country, not everything is easily comparable. Nevertheless, the table provides an overview of some key aspects of citizen ownership of renewable energy facilities in the countries under consideration. Table 2 on page 38 provides some supplementary background information on energy market structures in the countries under consideration.

The remainder of this section is devoted to the summarising of important points from this literature review in three areas: different ownership models, different rationales attached to energy cooperatives and development processes over time.

	Denmark	Netherlands	UK	Germany	Austria
Forms of citizen ownership	Small private investors (mostly farmers), general partnerships ('cooperatives')	Small private investors (mostly farmers), cooperatives	Broad variety of 'community energy' projects, some with citizen ownership. Partly co-ownership with commercial investor	Ownership of shares of project developed by professional developer (e.g. GmbH & Co KG), cooperative(-like) organisations	Farmer cooperatives, partly cooperating with utilities, more recently also ownership of shares in wind energy projects
Role of citizen ownership of RET	Central role for wind power development	Marginal role for cooperatives in terms of installed capacity, possibly important as catalyst actors. Small private investors most important entrepre-neurial group around 2000	Traditionally very low. Since 2000: development of various community energy projects	Historically: ensuring electricity provision in rural areas in early 20th century. Significant amount of installed capacity in wind power citizen-owned	Central role for diffusion of biomass district heating systems
Time span	From 1970s, esp. 1970s and 1980s	From late 1980s (Cooperatives esp. late 1980s and early 1990s)	From around 2000	From late 1980s	From 1980s
Main technology	Wind power	Wind power	RET in general	Wind power, PV	Biomass district heating, wind energy
Supporting factors	Strength of anti-nuclear movement, stepwise form of technology development, gradually emerging policy support, feed-in regulation, original ownership restrictions favouring local ownership, favourable tax and financing schemes	Strength of anti-nuclear movement, at later stage: favourable tax schemes, liberalisation of electricity markets, spatial planning pro-cedures (easier to handle for local actors)	Recent government support for community energy projects, regional funding and support agencies (funding discontinued in England in 2007)	Feed-in tariffs, tradition of energy-activism, tradition of acting in political associations, easy availability of loan capital, sufficient number of people with financial possibility to invest, environmental sensitivity	Interplay of local initiatives and public policy, policy goal to support agriculture and forestry, special grants made available to cooperatives

Table 1: Overview of country cases (continued on page 37)

	Denmark	Netherlands	UK	Germany	Austria
Inhibiting factors	In later stages: spatial planning procedures, incentives / demand for concentration	Volatile policy support for wind power, policy focus on large scale installations, originally need to negotiate remuneration price with regional utility, later demand for concentration	Traditional focus on large scale installations / corporate ownership, in particular also in renewable energy policy (Renewables Obligations), absence of strong alternative energy movement	Administrative burden with some of the possible legal forms	opposition from natural gas industry
Developments over time	From 1980s / 1990s: Industry taking over turbine development, process of concentration in ownership structures from 2002 ('repowering')	Positive effects of liberalisation and tax schemes in the 1990s but at the same time also demand for concentration	Still very recent development. Co-ownership with commercial investors could become widespread practice	Increasing commercialisation and concentration in wind energy, increasing importance of investment funds in PV but also increasing number of cooperatives in PV, emergence of specialised support organisations for energy cooperatives	from a regional innovation system (dominance of regionally based actors) to a sectoral innovation system (dominance of actors from the agricultural / silvicultural sector)
Role of utilities	Utilities 'forced' into wind power, originally reluctant to engage	National policy preference for large players, e.g. utilities Engagement in wind energy became attractive for them by late 1990s	Early liberalisation of energy markets. Main government policy focus on large commercial players, e.g. utilities	Increasing entry of utilities into wind power in early 2000s	Some cooperatives cooperate with utility companies (issue of consumer trust)

Table 1: Overview of country cases (continued from page 36)

Structure of electric energy industry prior to liberalisation (before 1989), data taken from Serrallés (2006 p. 2543), except data for Austria supplemented on the basis of http://gw.eduhi.at/thema/energie/liberal/liberal.htm, accessed 29 August 2010

	Denmark	**Netherlands**	**UK**	**Germany**	**Austria**
Primary fuel	Coal and gas	Gas and coal	Coal and nuclear	Coal and nuclear	Hydro
Ownership	Public and private	Public	Public	Public and private	Public
Geographical scope of energy utilities	National, regional and local	Regional and local	National and regional	Regional and local	National, regional, and local
Vertically integrated [4]	Partly	Partly	Partly	Fully and partly	Partly

Implementation of EU Electricity Directive (liberalisation), data taken from Serrallés (2006 p. 2548)

Full opening date	2003	2003	1999	1999	2001
Biggest three generators share of capacity	78%	59%	36%	64%	45%

Further national energy indices, data taken from Eurostat website http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/data/main_tables, accessed 29 August 2010:

Share of electricity consumption from renewables, 2007	29%	7,5%	5,1%	14,8%	60,5%
Share of energy consumption from renewables, 2007	17,3%	3,6%	2,1%	8,3%	23,8%
Dependency on energy imports, 2007[5]	-24,9%	38,9%	20,2%	58,6%	68,8%

Table 2: Overview of energy market structures

[4] Integration of generation, transmission and distribution
[5] Net imports divided by gross national consumption

6.1 Ownership models

Differentiation between different ownership models

A number of different ownership models for citizen-owned renewable energy facilities can be found. This includes small private investors (individuals – typically locals, often farmers, e.g. in Denmark and the Netherlands), cooperatives and cooperative-like organisations, citizen ownership of shares in a project or company led by a professional / commercial project developer as well as different models of co-ownership with a commercial investor (e.g. UK). Legal forms obviously vary between, but also within individual countries, with the legal form of a cooperative only being relevant in a limited number of settings (e.g. collective PV ownership in Germany, biomass district heating in Austria).

Enzensberger et al. (2003) differentiate between three types of local citizen investors along the dimensions individual/collective and citizen/professional project-lead: private individuals owning and operating renewable energy facilities, small private investors owning shares of a project within a cooperative and small private investors owning shares within a project developed by a professional project developer (p. 194). Walker also points to the frequent distinction between communities of interest and communities of locality (dispersed / concentrated collective ownership). The relevance of a 'community of locality' may increase further, if a project is designed not for feed-in to the national grid, but for local consumption of the energy produced, as in the case of biomass district heating systems (Weiss, 2004, Rakos, 2001). Furthermore, Maruyama et al (2007) and Warren and Mc Fayden (2010) draw attention to a *symbolic* dimension of citizen ownership, pointing out that a 'sense of ownership' can sometimes be more important than ownership in a strictly legal sense.

On this basis *the following dimensions seem to be of a certain relevance for the distinction between different types of citizen ownership of renewable energy facilities*:

- Individual (small private investor) / collective
- Locally concentrated / geographically dispersed collective (community of locality / community of interest)
- Energy produced for feed-in / local consumption
- Control over project lead / participation (project or company shares)
- Full ownership / co-ownership with professional investor
- Legal ownership / sense of ownership (may be additional to or instead of to legal ownership)

Pragmatic issues in relation to ownership models

With respect to the choice of a particular legal form a number of authors have pointed to some pragmatic aspects that need to be considered. Above all this clearly includes

restrictions in the national regulative framework, such as the initial Danish regulation that wind turbines had to be owned directly by electricity consumers, which excluded the legal form of a cooperative (Bolinger, 2001). Further pragmatic aspects include liability issues, tax advantages, start up costs, the administrative burden entailed, flexibility with respect to the number of projects that can be realised and with respect to the entry and withdrawal of members and management / governance issues (e.g. democratic self governance in cooperatives) (Bettzieche, 2009b, Bolinger, 2001, Enzensberger et al., 2003, Rutschmann, 2009). Furthermore, also trust from consumers may play a role, as was the case in Austria where a lack of trust in the competencies of local farmers led some farmers' cooperatives to co-operate with regional energy utilities (Weiss, 2004).

Ownership model and attached rationales

Different rationales have been attached to citizen ownership of renewable energy facilities by the people involved. It appears that, especially in Germany, initiatives in the legal form of a cooperative are often tied to explicitly political goals of democratisation and empowerment (Flieger and Klemisch, 2008) while citizen led wind power projects in the form of limited partnerships or the GmbH and Co. KG structure tend to be relatively commercially oriented (Enzensberger et al., 2003). For the British case, Walker et al. (Walker et al., 2007) find that the flexible interpretation of the term 'community energy' (also in terms of the rationales attached) has enabled experimentation with different ownership models.

Cooperative ownership models and size

One open issue of debate is the extent to which citizen-led, cooperative-like renewable energy projects are linked to small project sizes. While Barry and Chapman (2009) as well as Warren and McFayden (2010) explicitly link small-scale wind power to the possibility of community ownership, Toke (2005) argues that commercially sized community wind power projects are desirable and also feasible under the 'Renewables Obligation' (RO) policy in the UK. In his view, issues of ownership and size have become falsely linked because in Denmark larger projects typically are owned by utilities while smaller projects typically are owned by cooperatives or farmers - due to original legislative restrictions on the extent of ownership for individuals. Similarly Danielsen (1995) argued for the establishment of large-scale off-shore wind farms with the possibility of ownership by windmill guilds (not possible at the time of writing of the paper). Bolinger (2001) points to the Middelgrunden wind turbine partnership as an example of a commercially sized, though clearly exceptional example of a community wind project.

6.2 Different rationales attached to energy cooperatives

Different rationales for energy cooperatives or other forms of citizen-led renewable energy facilities have been pointed to in the literature. These rationales may be differentiated along

the dimension instrumental / normative as well as with respect to the actor group adhering to the rationales in question:

Instrumental rationales

With respect to *policy makers*, the following instrumental rationales have been referred to:

- Increasing public acceptance, especially in the area of wind power (Walker et al. 2007; Enzensberger et al. 2003; Bolinger 2005; Breukers and Wolsink 2007; Wolsink 2007; Agterbosch et al. 2009; Toke et al. 2008; Warren and McFayden 2010)
- Educating the public about renewable energy (Walker et al. 2007)
- Rural regeneration / support for agriculture and forestry (Barry and Chapman, 2009, Madlener, 2007, Walker et al., 2007)
- Distributed generation benefits (Barry and Chapman, 2009, Warren and McFadyen, 2010)
- A 'vehicle towards developing wind energy business to its present state of market maturity' (Enzensberger et al. 2003, p. 191)

Project developers may hold the following rationales towards citizen involvement:

- Gaining access to (additional) capital (Barry and Chapman, 2009, Enzensberger et al., 2003, Warren and McFadyen, 2010)
- Incrasing public acceptance (see above)
- Political leverage effect: local citizen support conducive to political support (Enzensberger et al., 2003)
- Profiting from additional (local) knowledge (Breukers and Wolsink, 2007)
- Operational advantages: locals reporting unusual events (Enzensberger et al. 2003)

Interestingly possible instrumental rationales of *the citizens involved* are discussed much less in the literature. However, reference has been made to the following aspects:

- Ecologically sensitive and/or profitable investment opportunity (Maruyama et al., 2007)
- Making use of economic 'spillover effects', e.g. utilisation of wood residues by farmers owning forests (Rakos, 2001, Weiss, 2004)
- Local community regeneration (Breukers and Wolsink, 2007, Devine-Wright, 2005)

Normative rationales

Normative rationales held by involved citizens (and, to some extent, policy makers) also are not discussed very extensively in the literature, but may be taken to encompass:

- Consumer empowerment (Flieger and Klemisch, 2008)

- Enhancement of democratic legitimacy (Breukers and Wolsink, 2007)
- Contribution to environmentally friendly energy generation (Agterbosch et al., 2004, Flieger and Klemisch, 2008, Maruyama et al., 2007)
- Enhancement of community cohesion (Rakos, 2001, Rogers et al., 2008, Walker et al., 2010)

Institutional framework conditions and dominant rationales

Some authors have hinted at the possibility, that dominant rationales towards citizen-led renewable energy facilities in a particular country may be influenced by institutional framework conditions. Thus Bolinger (2001) attributes the comparatively commercial nature of citizen-led wind power projects in Germany to strong financial incentive structures, attracting a group of private investors motivated more by profitability expectations than by empowerment and democratisation ideals. Toke et al. (2008) also points to cultural factors. They note that concerns over landscape protection are relatively strong in the UK, thus giving weight to the idea of achieving public acceptance by local ownership models. Spain, by contrast, has hardly experienced opposition to wind power related to concerns over landscape protection, thereby providing little ground for arguing for local ownership as a means to increase public acceptance.

Agterbosch et al. (2004) presents a somewhat reverse argument, suggesting that the fact that energy cooperatives in the Netherlands were characterised by an 'ideaslistic approach' (i.e. normative rationale of promoting a sustainable society) made them 'immune' to the institutional / regulatory framework, at least to a certain extent.

6.3 Development processes over time

Commercialisation and concentration

Several authors have noted processes of commercialisation and concentration in countries with a comparatively strong record of cooperative-like renewable energy initiatives (Denmark, Netherlands, Germany). The following aspects of such developments may be differentiated:

- Existing citizen-led initiatives becoming more commercially oriented (especially in Germany, see Bettzieche (2009a) for the case of PV and Enzensberger et al. (2003) for the case of wind power)
- Increasing entry of large commercial actors in areas (esp. wind power) where previously cooperative-like initiatives and small private investors dominated and an ensuing process of market concentration (Germany, Netherlands and Denmark, see Agterbosch et al., 2004, Bettzieche, 2009a, Boon, 2008, Enzensberger et al., 2003, Olesen et al., 2004)

- Professionalisation of technology development and supply: emergence of specialised industry (Jørgensen and Karnøe, 1995 for the case of wind energy in Denmark)
- A weakening of links to the alternative energy movement (Jørgensen and Karnøe, 1995 for the case of wind energy in Denmark)

In Germany, however, there also appears to be simultaneous counter-trend to commercialisation, with an increasing number of 'real' cooperatives emerging in the area of PV in recent years (Bettzieche, 2009b).

Institutional alignment and adaptation

In view of the developments of commercialisation and concentration described above, some authors have characterised citizen-led renewable energy initiatives merely as a temporally limited 'stepping stone' necessary to prepare the ground for other market actors (e.g. Enzensberger et al., 2003). However, a number of authors have also pointed to durable processes of institutional alignment and adaptation that occurred in response to the emergence and diffusion of cooperative-like renewable energy initiatives. The following hints / examples may be found in the literature:

- In Denmark the institutional setup in general shifted in favour of more decentralised systems (Jørgensen and Karnøe, 1995)
- In Denmark, utilities, initially reluctant towards engaging with wind energy, had to struggle to regain their former position and were somewhat 'forced' into wind energy business (Jørgensen and Karnøe, 1995)
- Spatial planning rules were adapted in various countries (Breukers and Wolsink, 2007, Danielsen, 1995)
- Specialised advice, financing and insurance schemes / support organisations emerged in various countries (see Olesen (2004) for Denmark, Rutschmann (2009) for Germany and Madlener (2007) for Austria)

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