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Published in:
Energy Policy

DOI:
[10.1016/j.enpol.2018.02.008](https://doi.org/10.1016/j.enpol.2018.02.008)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2018

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

de Boer, J., Zuidema, C., van Hoorn, A., & de Roo, G. (2018). The adaptation of Dutch energy policy to emerging area-based energy practices. *Energy Policy*, 117, 142-150.
<https://doi.org/10.1016/j.enpol.2018.02.008>

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The adaptation of Dutch energy policy to emerging area-based energy practices[☆]

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ARTICLE INFO

Keywords:

Energy policy
Energy initiatives
Local
Adaptation
Renewable energy
The Netherlands

ABSTRACT

This paper sheds a light on how local conditions affect renewable energy innovation. As empirical case, we study an energy transition policy regulation in the Netherlands: the zip code-rose regulation (PCR) intended for community energy initiatives. Firstly, we analyse the capacity of the PCR to facilitate the accommodation of renewable energy projects by community energy initiatives. Secondly, we analyse how emerging area-based energy practices are feeding back into the energy policy system. Based on empirical evidence from a desk study and interviews with community energy initiatives and key governance actors we find that the policy does provide a modest incentive for initiatives to develop renewable energy projects under local conditions. Nevertheless, the policy falls short of allowing initiatives to openly seek for locally desired solutions and hence, to increase opportunities at a local level to develop projects based on local conditions. However, current difficulties with the policy are being considered at a national level urging for adaptation of Dutch energy policies.

1. Introduction

A relevant policy question is how the accommodation of renewable energy installations in local communities can be facilitated. Research shows that the accommodation of renewable energy installations, such as wind turbines, bio-digesters and solar PV, can benefit from a close connection to local communities and accordance with local institutions (Nadaï and Van der Horst, 2010; Van Kann, 2015; Wiersma and Devine-Wright, 2014). In existing fossil fuel-based energy systems, the electricity system has relatively few extraction and production locations. Electricity is transformed and transported through a one-way grid to local end-consumers (Pagani and Aiello, 2012). In emerging renewable energy systems, by contrast, energy is generated on smaller scales at multiple production locations, including individual household units. While some installations are clustered in large wind parks or solar fields, many are also strongly dispersed through space (Bridge et al., 2013). For most renewables only modest amounts of electricity can be generated per installation. Hence, these installations are far greater in number of production units, while they typically require large amounts of space and are installed well visible for local communities (European Commission, 2016; Van Hoorn et al., 2010). As a consequence, developing renewable energy projects often takes places in close connection

to spatial-physical conditions as well as socio-economic conditions. These include a range of local conditions such as favourable sun conditions, suitable locations for solar PV panels, a local base support network, economic opportunities, and a supportive municipality. Connecting with local conditions can be a crucial precondition for these projects being socially accepted and economically desired. Hence, this paper suggests that taking local conditions into account can be beneficial for energy transition policies.

Among the recent innovations in energy policies are attempts to adapt regulations to developing renewable energy projects on a local scale. In this paper, we target an example of such a policy innovation: the Dutch zip code-rose regulation,¹ which is hereafter discussed as the PCR policy. The PCR is intended for community energy initiatives by allowing participants in a single energy initiative to share ownership of electricity production sites for electricity among participants (Belastingdienst, 2016). The main benefit is for citizens and small entrepreneurs that have no access to production sites, such as on their own roofs. By participating in a PCR also these actors can have their own solar panels, but just on a different location. The result is a far larger degree of flexibility to include both actors with potential for electricity production (e.g. large roofs of company buildings) and those without such opportunities (e.g. those without a roof for PV panels) to

[☆] This paper was originally prepared and submitted for a different issue, but the Editors considered it merited publication in its own right.

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¹ In Dutch language, the regulation is called the 'Postcoderoosregeling' (PCR).

join forces within a project. If successful, the PCR will thus allow for the realisation of more local renewable energy projects.

In this paper, we are firstly interested in the capacity of the PCR to facilitate the accommodation of renewable energy projects by community energy initiatives. We want to know whether the PCR facilitates linking projects to people in a local context. We are, however, also interested in the impact of the PCR on the Dutch energy policy system. After all, the PCR is a novel regulation meant to increase possibilities to develop energy projects on a local scale. While working with the regulation, new practices are tried and tested that might influence existing practices and notably, the policies and regulations surrounding them. Hence, our second interest is analysing how new practices are feeding back into the energy policy system. We want to know how key governance actors are reflecting on the experiences with the PCR in practice and whether this is inducing policy changes.

In the following section, we describe the potential role of energy policy for accommodating area-based energy practices. Then we describe the methods, the PCR policy and the findings of our analysis, which are followed by some concluding remarks on how energy transition policy accommodates community energy initiatives.

2. Accommodating area-based energy practices?

The existing energy system has developed institutionally to support a stable flow of energy delivered to consumers with a high degree of certainty. An important pillar of the energy system is electricity, which is still predominantly based on fossil fuels (Eurostat, 2016). Electricity is generated at large production sites and transported over often large distances through a one-way grid from producers to local end-consumers (Pagani and Aiello, 2012). In the electricity system producers and consumers are separated. This separation is further strengthened as access to the electricity grid by individual citizens or small entrepreneurs producing excess renewable energy was heavily constrained and is only recently becoming easier. As such, the institutional development of the energy system, including a range of energy policies, regulations, taxes and contracts, tends to reinforce existing practices and needs adaptation if new energy practices are to become possible, let alone more dominant. For example, renewable energy is taxed the same as fossil fuel-based energy in the Netherlands, thus rather reinforcing existing fossil-based practices with large production installations than instigating new practices.

Due to the rise of renewables there is also a rise of new practices that coincide with a need for altered institutional developments (cf. Bridge et al., 2013; Hajer, 2011; Shove, 2010). Energy practices are ways of producing and consuming energy: “a routinized type of behaviour which consists of several elements, interconnected to one other” (Reckwitz 2002, p. 249 in: Hargreaves et al., 2013). Although the energy system is still relying on large production sites, we also see increased opportunities for citizens and small entrepreneurs to be involved. This involvement is also visible with many bottom-up initiatives being developed in which citizens and small entrepreneurs try to become prosumers or even producers themselves (Hoppe et al., 2015). Many of these energy initiatives are local in nature and based upon communities taking action (Wiersma and Devine-Wright, 2014). These initiatives create novel practices “out of discontent with, and in relation to, existing practices” (Hoffman and Loeber, 2016, p. 692). Motives for energy initiatives include an urge to foster sustainable development and to have production sites in their own vicinity. For example, solar PV panels on a rooftop or a wind turbine in a field close to a village or neighbourhood are means of developing community based initiatives for the benefits of these communities.

These bottom-up developments are leading to adaptation of existing energy policies and new energy transition policies and sometimes are also made possible by such adaptations. The opportunities that the changing institutional framework offers are varied. They include

examples such as rights for Net Energy Metering² enabling citizens to become so-called prosumers by factoring in privately produced renewable energy on their energy consumption bill (Ramírez et al., 2017); favourable feed-in-tariffs for electricity from renewable resources (ibid.); but also investments by decentralised governments in renewable energy installations to support WIMBY (welcome in my backyard) (SER, 2017). Despite these examples, energy policies and regulations are still far away from being able to fully accommodate and foster new energy practices and, notably, bottom-up initiatives. Past experiences with energy policies in the Netherlands have shown that the pursuit of renewable energy innovations has often faced constraints due to ill-fitting regulations, institutional practices and policy incentives (Negro et al., 2012; Van Hoorn et al., 2010). Rather, the Netherlands is a good example of a nation progressing through a process of learning by doing. Involved actors actively monitor and reflect on existing and emerging energy practices. Nevertheless, adjustments remain modest so as to avoid the accommodation of new renewable energy practices to have negative disadvantages that compromise energy security, safety, fairness, spatial quality, etc. (cf. Bouzarovski and Simcock, 2017; Herbes et al., 2017; Hölsgens, 2016; Pesch et al., 2017). The result is that there are still some key issues for accommodating local community energy initiatives in the Dutch case.

Among the issues is problematic access of community initiatives to local renewable energy projects, other than through placing solar panels on the individual roofs of households (Elzenga and Schwencke, 2015; Franken, 2014). Such access is notably relevant if the initiatives include people without gardens or rooftops or demand more electricity than these can provide. Without access to sufficient space, initiatives often lack capacities to develop a business case and generate sufficient investment capital to get started. Before the PCR policy, such access was difficult. There were subsidies for larger production sites, but they were meant for larger projects of a more industrial nature (called SDE+). Similarly, there are possibilities for individual citizens to exchange electricity. Nevertheless, there was no institutional niche for small initiatives with individual citizens and small entrepreneurs to join forces with smaller and rooftop owners or land owners such as supermarkets, car dealers and farmers that had possibilities to develop excess electricity, but were often too small for becoming industrial subsidized production sites. As a consequence, many smaller community energy initiatives have difficulty to deliver projects, and often remain with one incidental local project (Elzenga and Schwencke, 2015; Franken, 2014).

Among the possible responses to the problematic access of initiatives to projects is to allow for more flexibility in sharing production and consumption on a community scale. For one, the local scale is attractive for community initiatives as they might themselves use their local network and knowledge as a strategy to activate local resources such as social capital, (crowd)funding, space or rooftops. The result is that sharing risks among locals might be a means of reducing risks and developing a more realistic business case (De Boer and Zuidema, 2016; Zuidema, 2015). Secondly, taking local conditions into account may help projects to avoid running into trouble with social resistance (Batel et al., 2013), while they might also gain access to local support and resources such as investments and consumers. In both these cases, community energy initiatives and renewable energy projects are trying to creatively activate and combine local resources: time, money, space, knowledge and the people and groups that own these or have access to them. By doing so, initiatives gradually and experimentally create their area-based energy practice.

Such area-based energy practices have potentially synergetic

² Net Energy Metering is an accounting procedure that allows small energy users with a renewable energy installation, such as wind turbines and solar panels, to feed back the generated electricity to the network. The electricity generated is factored into their energy bill, so only the Net consumed electricity is to be paid for. Entrepreneurs and private house owners are eligible. Through this procedure, consumers do not pay energy taxes on the consumption of electricity they have produced.

benefits both for the energy system and for their spatial contexts. After all, these area-based practices might well be able to allow for more local community energy initiatives that are well connected to local spatial-physical, socio-economic and institutional conditions. In doing so, these initiatives also help the wider energy system of which they are part to adapt to local conditions. Such adaptation is a promising prospect in the face of societies' need to swiftly increase the share of renewables in our energy system and the realisation that these will have vast spatial and social consequences. In other words, area-based practices might well be tools to improve the fit between the currently changing energy system and the places and communities in which this change will become manifest (De Boer and Zuidema, 2015).

The PCR is among the Dutch attempts to increase the possibility for community energy initiatives to develop local projects. On the one side, the PCR means to give initiatives more access to somewhat smaller and non-industrial electricity projects. On the other hand, the PCR also gives the owners of somewhat larger sites that are too small for such industrial projects access to community initiatives. Hence, our first interest is to assess if the PCR facilitate citizens and entrepreneurs have increased access to a local renewable energy project and facilitate projects to access local resources. Secondly, we aim to assess if the PCR is a promising tool to help improve the fit between the changing energy system and local communities and places. As such, we assess if the energy policy system does adapt in response to the area-based energy practices the PCR allows: does the PCR facilitate initiatives to give feedback to key national governance actors in order to stimulate reflection on these area-based energy practices and to induce energy policy adaptation in response to these practices?

3. Methods

3.1. Case selection

The central case for this research is the Dutch PCR policy. The choice for the Dutch PCR policy is inspired by its intent to facilitate community energy initiatives to develop local renewable energy projects. As a consequence, the PCR is an example of an energy policy innovation that might well assist in making Dutch energy policies more sensitive to the inclusion of local conditions in emerging renewable energy systems. In addition, the Netherlands is considered a relevant example for the accommodation of area-based practices in notably urban areas, due to its high population density, energy intensive economy and the rapid rise of energy cooperatives and community initiatives (Oteman et al., 2014).

3.2. Analysing the PCR policy

To analyse the PCR policy, we mixed several research methods that allowed observing the PCR policy from different angles. We complemented the methods of desk research, interviews with community initiatives and questionnaires with governance actors. This approach is also based on the notion of triangulation (Flick, 2011).

To start with, we conducted a desk research on the PCR policy regulation in order to get an idea of the potential of the PCR policy to accommodate community initiatives finding links with local projects. We also discussed the PCR with two Dutch field experts who monitor the development of community energy initiatives in the Netherlands (interview with Schwencke and Elzenga, 2015). The PCR is described in detail in Section 4.

In the following research phase, we analysed the experiences with the PCR policy from the perspective of community initiatives and from the perspective of governance actors. From the community initiatives, we wanted to know to what extent the PCR policy is facilitating community initiatives to accommodate projects. We selected four community energy initiatives to study more in-depth. The following initiatives can be considered frontrunners and developed PCR-based projects:

Bergen Energie, De Ramplaan, Grunneger Power and Morgen Groene Energie. The selection was based on the discussion with the field experts. All four initiatives have a cooperative, a non-profit community organisation (some in addition to a general foundation structure), for generating, distributing and using solar electricity among their members. The four initiatives were manned by highly educated, well-networked and politically active citizens. We collected empirical material through desk research and semi-structured interviews. Through desk research we collected website information, reports and news items from the media. For the analysis we transcribed and coded the interviews in Atlas TI (De Boer, 2016).

Firstly, we inquired with which actors and artefacts the initiatives activated links for their PCR-based project development and mapped these links. Actors are persons and groups, such as a community initiative, firm or Ministry; artefacts are material constructs, such as a PV panel or journal article (cf. Reinhardt et al., 2009). This gave us an impression of how the PCR-based projects were linked with the community and wider institutional context.

Secondly, we inquired into the initiatives' positive and negative experiences with applying the PCR policy to their local project. This included questions on the accommodating and/or constraining PCR policy conditions. We also inquired their interaction with national governance actors who were involved in the PCR policy design. This was based on our initial findings from the desk study which indicated that several initiatives had been in contact with the national Ministry in charge of the PCR to improve the regulations based on the initiatives' experiences. This inquiry first helped to identify to what extent the PCR facilitated the development of a local renewable energy project. Notably, we analysed if the PCR facilitates linking of projects to people: access of citizens and entrepreneurs to a local renewable energy project, and access of renewable energy projects to local resources. We analysed whether the PCR policy was influencing if local conditions could be taken into account and whether this helped in developing projects. Secondly, this inquiry also allowed for identifying if the PCR had the potential to improve the fit of the changing energy system to local communities and places.

From the governance actors, we wanted to know how they reflected on the PCR and the local practices it accommodates and to what extent these reflections triggered adaptations of the energy policy system or considerations to do so. We conducted open questionnaires with four governance actors who are involved with the PCR policy: Association of Dutch Municipalities (Association VNG), Netherlands Enterprise Agency (Agency RVO), Ministry of Economic Affairs (Ministry EZ), and Network Operator Alliander (Alliander). The Agency RVO helps with compliance of the PCR. The Ministry EZ is a decision maker regarding the PCR. We inquired into their evaluation and future expectations of the PCR. This included questions on the spatial implications of the PCR, the respondent organisations' contact with community energy initiatives, and whether the experiences with the PCR projects stimulated further energy policy adaptation to local conditions and social learning. We operationalized this question by assessing if the PCR facilitates area-based energy practices to feed back into the energy policy system. In other words, if the PCR facilitates initiatives to give feedback to key national governance actors in order to stimulate reflection on these area-based energy practices and to induce energy policy changes in response.

4. The case of the PCR policy

To stimulate the accommodation of renewable energy, the Dutch national government developed energy transition policy (Ministerie van Economische Zaken, 2016; SER, 2013). Several policy regulations were installed so as to improve opportunities for renewable energy projects, such as the SDE+ since 2008 and 'Salderen' (Net Energy Metering) since 2011 (Ministerie van Infrastructuur en Milieu and Ministerie van Economische Zaken, 2013). Community energy initiatives and other

organisations make extensive use of the SDE+, which gives a financial incentive to rather big renewable energy projects by improving the electricity price for the electricity generated. Nevertheless, the most favourable funding tranche of the SDE+ is since 2014 yearly overwritten and therefore reduces confidence for investors to start projects (Hier Opgewekt, 2016a, pp. 33–34; PNO, 2015, 2014).³ ‘Salderen’, of which individual energy consumers including households and entrepreneurs may make use, is a Net Energy Metering tax incentive for private energy generation. ‘Salderen’ is useful for individuals and entrepreneurs who have the financial means and space (e.g. rooftop) to produce energy. Net Energy Metering allows individual house owners and small entrepreneurs to factor in privately generated electricity with e.g. solar PV panels on their electricity bill. This implies that without having your own renewable energy installation, there is no opportunity to benefit from Net Energy Metering. Furthermore, if more electricity is delivered than used, only a modest prize is being paid reducing the incentive to the use of available space on rooftops beyond what individuals need themselves.

The existing regulations did accommodate local entrepreneurs, companies and citizens to develop energy projects. Notably, however, this was only possible if they had access to either sufficient space (e.g. rooftops) for PVs or - in the case of the SDE+ - somewhat larger investment opportunities. For many local entrepreneurs, companies and citizens these regulations were rather unsuitable. Especially, these regulations were problematic for community energy initiatives that also aimed to include people without suitable rooftops and, as most do, lack the investment opportunities needed for the larger scale SDE+ projects. In response, the PCR was developed in 2014 with the aim to provide an alternative.

The PCR policy is an energy transition policy regulation intended for community energy initiatives.⁴ Under the PCR policy, community energy initiatives⁴ can set up local projects to cooperatively generate renewable-based electricity projects. The PCR is only available for initiatives that create a so called ‘energy cooperation’, which is a specific legal format under Dutch law (Visbeek, 2016). As such, the PCR aims to specifically accommodate projects based on the collaboration of community based actors including citizens, a foundation, house owner association and/or small entrepreneurs. Although only solar PV projects are on the radar in practice, the regulation also allows for other renewable energy resources (e.g. wind). The idea is that a local participant invests in a share of the solar PV panels from the PCR-based project and receives a tax reduction on the energy bill for the energy produced and consumed with that share of solar panels up to a certain maximum; i.e. the maximum coincides with the amount of electricity the participant individually uses (Belastingdienst, 2016). Furthermore, the electricity produced by the project is sold to energy companies for an attractive market prize and benefits are distributed based on the shares of each individual investor. The PCR thus tries to provide citizens and small entrepreneurs access to renewable energy projects, while smaller projects can also gain access to citizens and small entrepreneurs as small investors. The search area for project participants is restricted to citizens and small entrepreneurs signifying its aim to target communities, of which all participants have to be located within the zip code-rose – the area including only the four-letter zip-code of the renewable energy-generating site and the four-letter zip codes directly bordering it (see Fig. 1 for an example).⁵ Consequently, the PCR

indeed targets local community based energy initiatives.

The PCR makes part of the Dutch Energy Agreement, comprising a set of measures and additional targets per sector in order to reach the Dutch sustainable energy milestones for a renewable energy system (Ministerie van Economische Zaken, 2016).⁶ The agreement was signed in 2013 by 47 parties, ranging from governments, NGOs to energy agencies (SER, 2013). By the end of 2016 Dutch initiatives have realised some 55 PCR-based projects (Hier Opgewekt, 2016a, p. 33). The PCR is expected to grow, but not substantially (Interview with Agency RVO, 2016; interview with Association VNG, 2016; interview with Ministry EZ, 2016).

5. Findings

We start this section with analysing to what extent the PCR facilitates citizens and entrepreneurs to have increased access to a local renewable energy project and facilitates projects to access local resources. Although the PCR is designed to do so, a key question is how the regulations translate into the fine-grained realities where voluntary based organisations have to develop a successful business case. Hence, we first assess in Section 5.1 if the PCR is – on paper – working out as it was intended. After that, we will in Section 5.2 assess the actual area-based energy practices developed while using the PCR and assess if they show that projects and communities have been able to find each other. Then we analyse to what extent the PCR facilitates energy policy adaptation in response to the area-based energy practice; i.e. does it also improve the fit between the changing energy system and local communities and places. In Section 5.3 we assess how the PCR policy is itself subject to reconsideration and adjustment based on these area-based experiences. In Section 5.4 we take the last step and assess if the PCR induced practices are also influencing the wider energy policy system to consider local conditions. The findings are also listed in Table 1 and presented per subsection, e.g. “1. A” is finding A of Section 5.1.

5.1. Encouraging area-based energy practices – On paper

The PCR requires participants to live within the area of the local zip code-rose (1. A). This implies that the size of such areas is usually between a few square kilometres in urban areas to possibly a few 10 s of square kilometres in rural areas. The idea was that doing so would allow only for local community based projects. In practice, the amount of citizens and small entrepreneurs located in a zip code-rose can differ significantly, ranging from 15 residents to over 40.000 (Greenspread, 2014). As such, the use of the zip code-rose does activate local projects, but is in more rural cases easily too constrained for activating serious community initiatives. If the scale is large enough, the PCR does successfully enable citizens and small entrepreneurs who do not have a suitable rooftop for solar PV panels to participate in a local collective solar project, thus enabling the use of another rooftop in the community (1. B). The question, however, is if the PCR is also attractive enough. The PCR extends the tax reduction for individuals (‘Salderen’: Net Energy Metering) to a community group living within the zip code-rose area (1. C). The PCR benefits are now set at 9ct per kWh and 15 years per project. This implies under current conditions a payback time of roughly 10 years per investment share, which leaves 5 years for receiving net benefits. Although this seems realistic, there is a serious amount of administration required which might well reduce willingness in the face of fairly modest benefits per share.

What is clear, however, is that the PCR encourages initiatives to

³ The SDE+ is a financial incentive system to stimulate sustainable energy production by supporting renewable energy initiatives to overcome the problem of economic unviability. The SDE+ is available for companies and non-profit organisations – not for individual citizens – and a solar project should have a high voltage connection to the grid, which implies a reasonable project size (RVO, 2016).

⁴ A community energy initiative, from citizens, a foundation, house owner association and/or small entrepreneurs, may only do a PCR project if it creates an individual energy cooperative for the PCR project (Visbeek, 2016).

⁵ Per 1–1-2016 the zip code-rose is extended: the energy generation plant no longer needs to be in the middle of a so-called zip code-rose, but can also be in one of the ‘petals’.

⁶ Firstly, 14% renewable energy in the total share of Dutch energy consumption in compliance with EU obligations in 2020; secondly, following a Dutch coalition agreement, 16% renewable in 2023; and thirdly, a ‘completely sustainably’ energy system in 2050 in compliance with the EU Road to a renewable energy system – although there is much debate on what the latter ambition actually means in practice.

Fig. 1. Zip code-rose in the city of Bergen around zip code 1862 of the energy generation site.

develop area-based practices in which local parties share (im)material costs and benefits of renewable energy innovation (1. D). The PCR makes it possible for rooftop owners and investors in PV to join forces in the development of a PV project and share costs and benefits while doing so. As such, the PCR accommodates both the inclusion of local investors in local projects and access to local projects for local investors. In the meantime, the serious administration burden is done by the initiatives and verified by the tax authorities. The detailed administrative PCR policy conditions (see Section 5.2, finding 2. A), necessitate local administrative innovation, which is partly dependent on the commitment, time and expertise of various actors in the community (1. E). Despite being a burden, there is a spin-off in terms of institutional innovation in communities. Finally, a PCR-based project links together a good number of local citizens to one energy distribution company, which can contribute to the emergence of more area-based energy distribution companies (1. F).

In other words, on paper, the design of the PCR policy can strengthen initiatives' ability to develop renewable energy projects within a rather small area by making use of the potentials of the local community. Nevertheless, there are some warning signs that success is not very easy to achieve and that it is constrained to highly enthusiastic and fairly professional initiatives. In the following subsection, we analyse how the initiatives are experiencing this.

5.2. Encouraging area-based energy practices – In practice

The practice of working with the PCR policy indeed reveals it is not an easy or smooth process. Instead, community initiatives have to invest serious time and energy in making the project work. Having said

that, we only studied initiatives that had already some experience with doing projects and can thus be assumed somewhat experienced. Nevertheless, we found that they faced some serious problems.

To begin with, the interviews revealed that initiatives need to arrange many complicating administrative issues before the PCR policy can be applied (2. A). These issues include both general and site-specific conditions. Administrative issues in general are: the PCR requires initiatives to create a separate legal cooperative specifically for a PCR-based project. Furthermore, like many projects, a business case needs to be created. Doing so is not that easy. A rooftop, field or roadside needs to be found that can be used for the upcoming 20 years within the vicinity of a sufficient number of potential PCR-participating citizens. Not all land owners or owners of larger rooftops such as local entrepreneurs are willing to commit that long. Even if they do, a next administrative challenge pops up: for a rooftop, an act of building rights needs to be created – a so-called 'Opstalrecht', which separates the legal owner rights for the building and the rooftop. The number of administrative issues, which are both general and site-specific, make the PCR complicated to apply. Solving the administrative issues and the promotion of the project in order to involve citizens in the project takes a lot of time of the volunteering citizens of the energy initiatives and puts a burden on the organisational resources of the initiative (2. B).

Next to its administrative challenges, the PCR-based project requires quite some financial pre-investments, which burden the financial resources (2. C): "the juridical experts cost money and [since finding sufficient participants is not easy] we also made a video to promote the PCR project, this is all 'out of the pocket' money." (Interview with Morgen Groene Energie, 2015). Once investors are found, the problem remains that even after adaptation of the tax incentive, the business

Table 1
Overview of PCR case study findings.

1.	Encouraging area-based practices - On Paper
1. A	PCR requires participants to live within the area of the local zip code-rose
1. B	Enables the use of another rooftop in the local community
1. C	PCR extends tax reduction from individuals to a community group
1. D	Encourages developing area-based practices in which local parties share (im)material costs and benefits of renewable energy innovation
1. E	Detailed administrative PCR policy conditions necessitate local administrative innovation, which is partly dependent on the commitment, time and expertise of various actors in the community
1. F	A PCR-based project links together a good number of local citizens to one energy distribution company, which can contribute to the emergence of more area-based energy distribution companies
2.	Encouraging Area-based Practices - In Practice
2. A	The detailed administrative PCR conditions make the PCR complicated to apply
2. B	The administrative issues and project promotions cost a lot of volunteer time and burden the organisational resources
2. C	A PCR-based project requires quite some financial pre-investments, which burden the financial resources
2. D	PCR business case is meagre (even after adaptation of the PCR)
2. E	PCR-based project realisation takes too much time (much more than participants expect)
2. F	Arguably, the PCR keeps these initiatives in between amateur pioneering and professional organisations
2. G	PCR helps to expand local support base for low carbon projects, which facilitates local uptake of renewable energy
2. H	PCR can help to distribute the benefits of the tax regime in the area, potentially creating a collective benefit
2. I	Finding enough participants within the zip code-rose-area is not in all areas self-evident
2. J	Initiatives depend on the participation of citizens who also accept to switch to the energy service company, which is contracted for the PCR project
2. K	Some initiatives need to attune the project area according to the zip codes adjacent to the selected rooftop for the PCR project
2. L	Access to local resources is also rather complicated with, especially, misfits occurring between the work conducted by community initiatives and the wider institutional context, notably municipalities
3.	Adapting the PCR Policy
3.A	Improved the business case for local PCR-based projects with rather standard conditions, but still with many hours volunteer work
3.B	Virtual meter is now accepted instead of an expensive physical connection device for registration of the local energy uploaded to the electricity network
3.C	Larger share of small entrepreneurs is now accepted as PCR participant
4.	Adaptation of Energy Policy to Area-based Energy Practices
4.A	Considerations upon how energy policies can further facilitate local initiatives
4.B	Governance actors started to support initiatives with extra information on the PCR (web page with Q&A, lectures, etc.)
4.C	Existing organisation skills and capabilities of governance actors and energy actors are being challenged; i.e. how to deal with community energy initiatives is also a learning process for them
4.D	National government is also actively promoting more local and regional governance approaches focussed on the development of such skills
4.E	Initiatives found that activating local knowledge, commitment and resources was crucial to proceed with PCR projects in the face of modest returns on investment
4. F	Initiatives work together with many other local other actors, such as the municipality, citizens and other initiatives, to share lessons and learn from each other's expertise

case for a local PCR-based project with rather standard conditions remains with 1,5% return on investment very meagre⁷ (2. D): “A representative of the Ministry EZ told me he wouldn’t do it for such a small return on investment.” (Interview with Morgen Groene Energie, 2015) In addition, realisation takes much more time than participating citizens expect (2. E). All four initiatives took over a year to realise their project. “It was difficult to explain to our participating citizens why it was taking us so long.” (Interview with De Ramplaan, 2015) And as Bergen Energie remarks: “Our members are benevolent, they support us, but it is difficult to explain why it is so laborious and takes so long.” (Interview with Bergen Energie, 2015)

Due to the many constraints mentioned, PCR-based projects require a serious amount of local knowledge, committed participants and trust among participants. On the positive side, the PCR thus requires strong community capacity. Less optimistic is the realisation that the PCR keeps initiatives, arguably, on a path on which they develop projects falling in between amateur pioneering projects and professional projects (2. F): the scale of the project is small, while the regulation's complexity hinders widespread unrolling of PCR projects. “Although the design of the PCR is in essence very suitable for our collective community projects, the realisation is so complicated, that we are now focusing more on the SDE with crowdfunding.” (Interview with Grunneer Power, 2015) The PCR is for projects that are not suited for individual ‘Salderen’ (Net Energy Metering) and too small for the SDE + regulation, and hence, is only attractive for relatively small collective projects. Grunneer Power said: “We mainly do the PCR project since it brings us new customers for our renewable energy distribution co-operative NLD.” (ibid.). Grunneer Power, however, is arguably one of the more professional Dutch energy cooperatives, illustrating the

complexity of the PCR. The PCR, therefore, is allowing community energy initiatives to indeed find projects, but it requires a lot from the initiatives.

Alternatively, projects also do gain more access to local citizens and entrepreneurs by being developed through community initiatives and, while doing so, also to local knowledge and resources. According to our interviewees, the PCR regulation helps to expand the local support base for renewable energy projects, which facilitates the local uptake of renewable energy (2. G). In addition, this can also help to distribute the benefits of the tax regime in the area, potentially creating a collective benefit (2. H).

Nevertheless, there are again some serious constraints. Firstly, our interviews revealed that finding enough participants within the zip code-rose-area is not in all areas self-evident (2. I). For instance, due to the modest number of participants Grunneer Power had to reduce the envisioned size of the PCR project (interview with Grunneer Power, 2015). Secondly, the initiatives depend on the participation of citizens who also accept to switch to the energy service company, which is contracted for the PCR project (2. J). Each PCR project is administrated by one energy company, otherwise it becomes too much work and too costly to administrate for the initiatives.⁸ As Bergen Energie states: “the [PCR designing] officials thought we could do business with all those energy service companies, but that is an illusion: [...] one operates this way, the other that way. You cannot expect [to administer] that from all those initiatives, it is made way too complex.” (interview with Bergen Energie, 2015) This condition makes the group of potential participants within the zip code-rose even smaller.

Thirdly, some initiatives need to attune the project area according

⁷ A business case of 5% is considered average.

⁸ A nationally operating commercial energy initiative is developing a back-office system that can deal more easily with a wide variety of energy service companies.

to the zip codes adjacent to the selected rooftop for the PCR project (2. K). The area boundaries of the zip code-rose can interfere with the boundaries which local actors consider more logical. This might even obstruct the emergence of renewable energy systems in which the local scale plays an important role (cf. Section 2). In the case of Bergen Energie, citizens with zip codes of bordering municipalities are eligible to participate in the Bergen PCR project, while Bergen Energie feels more closely related to citizens of their own municipality, of whom some happen to live outside the zip code-rose: “This is insane, [the PCR policy designing officials] haven’t thought about that. So now we have to communicate with citizens from [the municipalities] Heiloo and Alkmaar, while people from [our municipality] Bergen cannot participate in [the PCR project] Van der Oord.” (interview with Bergen Energie, 2015) The communication with citizens outside of the municipality boundaries complicates the development of this PCR project. Moreover, this frustrates the inclusion of local parties and thus, the adaptation to local conditions.

Finally, access to local resources is also rather complicated with, especially, misfits occurring between the work conducted by community initiatives and the wider institutional context, notably municipalities (2. L). To illustrate: “At the municipality, which is politically benevolent, the officials are reluctant since [the PCR project] is not going fast enough and the projects do not fit with the existing procedures and regulations.” (Interview with Bergen Energie, 2015) Another example is the allocation of a PCR project in the municipality, which may cause intense discussions. In the case of Bergen Energie, the municipality first struggled to find out whether or not a building act was needed for solar panels on the selected piece of municipal wasteland. The municipality then issued the building act even before the province could have its say on the issue in the light of its environmental plan – which in turn caused discussion between the municipality and the province and caused delay for Bergen Energie to develop the project. Notably, province and municipality were disagreeing over whom was leading in making decisions on the building act, which in turn was caused by a lack of regulatory clarity. This illustrates that the PCR implies institutional innovation at the local and regional scale, explicitly in relation to spatial planning. So, while links are being made to local – in this case regulatory – resources, practice is showing that these links might also involve heavy struggles and resistance.

Concluding, we see that the PCR regulation does increase the possibilities both for community initiatives to develop projects and for projects to gain access to a local support base of investors, participants and resources. Nevertheless, PCR-based projects are difficult to realise for initiatives: in a socio-economic sense (regarding the business case, the pool of potential participants and the contract with one energy service company), in a spatial-physical sense (regarding the restricted project area) and in an institutional sense (regarding unadjusted procedures and regulations to area-based practices and a severe administrative burden). This limits the amount and the success of local renewable energy projects being developed under the PCR. The positive sign: in doing so, the PCR does stimulate or even require initiatives to enhance their local social network and to contribute to the socio-economic development of the local area.

5.3. Adapting the PCR policy

The experiences with the PCR in practice have not gone unnoticed by the designers of these regulations. This is also a result of interaction between community energy initiatives and the Ministries of Economic Affairs and Finances who are responsible for the PCR policy design. The initiatives communicated their struggles to apply the PCR through posts on the platform ‘Hier Opgewekt’ (Hier Opgewekt, 2016b), on blogs and in newspapers, letters to the Ministry Economic Affairs in which they stated a list of problems they encountered in the development of a local PCR-based project (Bergen Energie, 2014), and lobby efforts via influential contact and via political parties. Furthermore, a report with

several exemplary PCR business cases was sent to the Minister of Economic Affairs (Van Genugten, 2014) in which experiences with field experts (juridical, housing corporations, governments) illustrated the infeasibility of the PCR under prevailing conditions (Franken, 2014). At the same time the Ministry had also consulted GroeneMorgenEnergie who had developed the first PCR-based project and had table discussion with GroeneMorgenEnergie, DeRamplaan, another initiative and the niche platforms ODE Decentraal (interviews with Morgen-GroeneEnergie 2015; DeRamplaan 2015). As a government official says: “We have been in contact mostly about what went wrong in the application of the regulation” (interview with EZ, 2016).

The sharing of information leads to reconsideration of the PCR regulations and also induced some adaptations to it. The first adaptations improved the business case for local PCR-based projects with rather standard conditions (3. A). The tax-reduction was increased from 9ct to 11ct per kWh, and the time period for the tax-reduction has increased from 10 to 15 years (Belastingdienst, 2016). While improving conditions, a PCR business case is still only feasible due to many hours of volunteer work from the initiatives, which makes it a limited adaptation.

The improved financial conditions can allow for the PCR to increase the number of community initiatives and projects finding each other. This was also done by lowering some administrative burdens. Firstly, a virtual meter is now accepted instead of an expensive physical connection device for registration of the local energy uploaded to the electricity network (3. B). This device needed to be located at the PCR site – often next to an existing meter, which was cumbersome and costly in comparison to the PCR project size. Secondly, the share of participating small entrepreneurs in a PCR project is allowed to increase from 15% to 20% (3. C). This means that more citizens with a company at home can participate in a project, which makes it slightly easier for an initiative to find sufficient participants within the area boundaries of the zip code-rose. This adaptation also explicitly means to adapt the regulation to diverse local socio-economic conditions where sometimes small entrepreneurs with their knowledge and network play important roles in community initiatives.

We, therefore, conclude that the local PCR-based project experiences triggered small adaptations in PCR policy conditions. These adaptations give initiatives more leeway to develop projects and therefore increase opportunities for local energy projects. Nevertheless, the adaptations remain modest and the design of the PCR is still not closely attuned to the initiatives’ local renewable energy practices.

5.4. Adaptation of energy policy to area-based energy practices

Apart from adaptations to the PCR policy, we also found evidence that the experiences with the PCR are resulting in discussions upon wider energy policies. These discussions also explicitly involve considerations upon how energy policies can further facilitate local initiatives (4. A). To illustrate, as a governance actor states: “[the experience with PCR-based projects] gave an incentive to look better at how initiatives can be stimulated and facilitated better.” (Interview with Ministry EZ, 2016). In addition, governance actors started to support the initiatives with extra information based on the PCR experiences (4. B): “We developed a web page with information, handled Q&A internally, gave various lectures and gave support to Hier Opgewekt [platform for renewable energy initiatives].” (Interview with Agency RVO, 2016) Even governance actors, such as Municipalities, energy companies and Provinces, who were not involved in the PCR policy design indicate they are learning about what is institutionally and organisationally needed for the accommodation of local renewable energy projects. These are largely induced by the experiences with PCR-based projects highlighting a misfit between existing procedures and regulations and the area-based energy practices developed. The result is that existing organisation skills and capabilities of governance actors and energy actors are being challenged; i.e. how to deal with

community energy initiatives is also a learning process for them (4. C). Notably, new aspects such as the financial inclusion of citizens, voluntary based organisations and the negotiations with land owners all urge for new organisational skills for municipalities and energy companies. In response, the national government is also actively promoting more local and regional governance approaches focussed on the development of such skills (Interview with Association VNG, 2016) (4. D). One example is a national program for municipalities on “regional approaches, in which [energy] cooperatives play a role.” (ibid.)

The area-based practices induced by the PCR are resulting in a gradual process of reconsideration and change of both national energy policies and institutional responses by municipalities and energy companies. These area-based practices are thus showing themselves to be a trigger for policy change and are indeed tools to adapt existing energy policies and regulations to local conditions. This process of adaptation is, admittedly, still modest. Nevertheless, it is also important to note that the process of finding an improved fit between the changing energy system and local communities and places is a long-term learning process. The cases we studied also show an ongoing learning curve: the area-based practices are still being improved. To illustrate, the studied community energy initiatives indicated in the interviews that they learned about the importance of attuning the design of their PCR-based projects to local conditions in their communities. Notably, the initiatives found that activating local knowledge, commitment and resources was crucial to proceed with PCR projects in the face of modest returns on investment (4. E). Furthermore, the initiatives work together with many other local other actors, such as the municipality, citizens and other initiatives, to share lessons and learn from each other's expertise (4. F). Sharing lessons helped the initiatives to balance all kinds of project variables: creating business cases and comparing the risks and feasibility of an SDE-based project and/or PCR-based project under different project conditions such as the scale of the project, runtime, number of participating citizens and future electricity price developments. By doing so, the initiatives are learning to become professional in developing local renewable energy projects. Hence, the initiatives are pioneering not only themselves, but also urge other actors, such as the municipality and citizens, to learn and act outside of their comfort zone. As a result, the learning taking place at a local level within area-based practices continues to improve awareness of how to embed energy projects to local communities and places. It is a process that, if the dialogue between initiatives and (national) governance actors also continues, might well facilitate an improved fit between the changing energy system and local communities and places.

6. Conclusions

The rising share of renewable energy in the energy mix is creating an increased impact on our physical and socio-economic contexts in which renewable energy projects become manifest. This not only requires vast amounts of space and a risk of creating societal resistance to such projects. Also, it offers opportunities for (local) communities using renewable energy projects as social or economic opportunities. The result is an argument for energy transition policies that can promote locally embedded energy projects that have direct benefits for the communities involved. The Dutch PCR policy is an example of such a policy by targeting specifically community energy initiatives.

The PCR is a tool that clearly reflects an intention of bringing the innovations in our energy system and communities closer together. The PCR improves opportunities for community initiatives to develop renewable energy projects and is especially able to activate investments by those without having a roof or field to use for electricity production. The PCR also increases access of renewable energy projects to local communities and their resources. Mostly, it is within the context of existing community energy initiatives that projects are being developed by community volunteers, on the roofs of small local companies or organisations and with investments by citizens and small entrepreneurs.

Despite these results, the PCR does not seem to be a mayor game-changer. The number of projects started remains modest and practice shows that working with the PCR is both complex and shows fairly limited local benefits. Most of all, the PCR seems to be merely a step in the right direction.

The direction the PCR points towards, however, is promising. The PCR might not have been a serious game changer in the number of local projects started in the Netherlands. What it has done is to induce local innovation in the development of both community energy initiatives and small local renewable energy projects. This innovation might be its most promising result. For one, it is innovation that the communities themselves can internalize and use for future projects. Secondly, it is innovation that these initiatives share amongst each other and that have also created a process of learning and adaptation for the municipalities and energy companies that work with these initiatives. Finally, the area-based practices which create and are recreated by this innovation are also influencing national energy policies. The PCR itself was adapted in response to local problems encountered, while national governance actors are also considering the lessons now learned at a local level. Mostly, then, the PCR is an example of the kind of institutional innovation we need to engage with. At least, if we aim to connect changes in the energy system to the communities and places in which such changes are also becoming manifest.

Acknowledgements

This paper was based on research undertaken under MACREDES, a project funded by the EDGAR research programme, and DELaND, a project part of “Groen-Gas”, European Territorial Cooperation INTERREG IV A Deutschland – Nederland Grant 2012-2015 (number II-1-01 = 174 Groen Gas) and Energy Delta Gas Research (EDGAR) Grant 2011- 2014 (number C6).

With special thanks to Anne Marieke Schwencke and two anonymous reviewers.

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