

Local climate change capacity: comparing four municipalities in the Dutch Twente region

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Abstract: Climate change is seen as a key societal challenge to cities and regions. City governments design and implement policies to cope with climate change: on the one hand by mitigating greenhouse gas emissions and spurring low carbon transition; on the other hand by adapting to climate change, hence increasing resilience to extreme weather events. A precondition to successful climate change policy implementation is a sufficient degree of local capacity. In this paper we address how cities have manifested local capacities vis-à-vis climate change. The main question is: What does local climate change capacity mean in local governments when addressing both adaptation and mitigation? The research design concerns a comparative case study design of four municipalities in the Dutch Twente region. Four municipalities (two urban and two rural municipalities) were analysed. Data collection involved close examination of municipal programs and climate action plans, and also a set of twelve face-to-face interviews (three per municipality). Data were treated and analysed using Atlas.ti to allow for inter-municipal comparison. Results show that the four municipalities in general lack sufficient budgets for climate change policy. There is also a general lack of balance between climate change mitigation and climate change adaptation in local action plans. Moreover, only one out of four municipalities had a solid climate change action plan. This also holds for commitment to climate change goals, where a variation was found between municipalities. This appears not be related to any background determinants such as municipal size. Support of low carbon citizen initiatives appears to be low in the four investigated municipalities, except for the case of the municipality of Hof van Twente. Recently, the two urban municipalities (Hengelo and Enschede) have become aligned with a climate change adaptation network initiative, called ‘climate active city’. Finally, we found that there was networked collaboration between municipalities via a forum in which local climate change coordinators meet on frequent basis. The results contribute to a growing body of literature on climate change capacity and policy in cities and regions (cf. Kern and Bulkeley, 2009; Bulkeley, 2013; Bulkeley et al., 2013; Hoppe et al., 2014; Hoppe and Van Bueren, 2015).

Keywords: Climate change mitigation; Climate change adaptation; Low carbon capacities; Cities; Regions Climate governance.

1. Introduction/Background

Climate change is increasingly manifest and has been acknowledged as a grand societal challenge by the majority of countries in the World. As such in most countries climate change policies have been drafted and implemented (United Nations, 1998; IPCC, 2007). Attention to climate change in terms of policy and governance includes both adaptation (anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage they can cause, or taking advantage of opportunities that may arise) and mitigation (mitigation attempts to reduce the human impacts on the climate and includes major efforts on the global scale to achieve a reduction in Greenhouse Gas (GHG) emissions; IPCC, 2007). On both the adaptation and mitigation lines policies and programs have been developed. Moreover, climate policy in many countries involves multiple levels of government (Biesbroek et al., 2010). Like in (the broader) environmental policy it is local governments that have a key role in governing the challenges of climate change as the local level is the government level most closely to a country's citizenry, and it is at the local level where climate problems manifest and climate action can take place (Lindseth, 2003; Aall and Norland, 2005; Granberg and Elander, 2007; Hoppe and Coenen, 2011). Moreover, it is cities in which most carbon emissions occur, and it is cities that are most vulnerable to the impacts of climate change, such as the 'urban heat island effect', increased precipitation, and flooding (ICPP, 2007). With predictions on further growth of cities in terms of inhabitants, and related consumption of energy and other resources, cities are of great importance in strategies to mitigate and adapt to climate change (Bulkeley et al., 2013; Hoppe and Van Bueren, 2015).

Hence, local governments – in particular in cities – have an important role in the governance of climate change. They have shown that they can do this in several ways: as 'champion' (Bulkeley et al., 2013), as initiator of actions, as first mover to adopt clean tech innovations (Bulkeley, 2013), as seedbed of innovation (Geels, 2012), as policy implementing organisation (Hoppe et al., 2014), as regulator, as facilitator, network manager, as process- or project manager (cf. Hoppe et al., 2015). Although many cities have been active to address both adaptation (Van den Berg and Coenen, 2013; Runhaar et al., 2014; Uittenbroek et al., 2013) and mitigation (Bulkeley, 2012; Hoppe et al., 2014) often there appears to be a lack of integrated focus in terms strategy. Adaptation and mitigation have been divided by scientists and policy makers and practitioners as belonging to different sectoral policy domains (e.g. mitigation as 'energy' and adaptation as 'water' policy; Hoppe et al., 2014). Biesbroek et al. (2009) call this the 'adaptation-mitigation dichotomy'. Notwithstanding the latter there have been instances of cities that succeed of crossing the chasm, implementing integrated solutions and 'no regret options' (e.g., Uittenbroek et al., 2013).

While facing these challenges local governments are confronted to design and implement workable climate policies. Given the degree of urban and institutional complexity involved, this is more than - just another - governance challenge. It requires attention to both the nature of climate change related problems that might vary across jurisdictions, the politics of the policy

making process, and the commitment and compliance by local parties who are involved in local climate policy implementation (Hoppe and Van Bueren, 2015). The latter also heavily depends on capacities of local government, as well as capacities from its local partners. Following the signing of the Kyoto protocol many countries have embedded local capacity building in their national strategies. For example, in the Netherlands the far majority of municipalities succeeded in formulating their own. However, the role and influence by central government (via capacity building schemes) were of great importance in this process (Hoppe et al., 2014).

Although research into local climate policy is a vastly growing scholarly field (Jordan and Huitema, 2014a,b; Bulkeley, 2013; Hoppe and Van Bueren, 2015), there appears to be little attention into the mechanisms on how local climate policy works in practice. More insight in this phenomenon is needed. This was one of the key issues that was mentioned in a guest editorial of a special issue on ‘governing the challenges of climate change and energy transition in cities’ (Hoppe and Van Bueren, 2015). The guest editorial presented a research agenda in which systematic mapping of local climate policy practices of design and implementation of urban low carbon energy transition policy is presented. It is on this notion that this paper originates.

In this paper the main question is: What does local climate change capacity mean in local governments when addressing both adaptation and mitigation? We apply this research question to four municipalities in the Dutch Twente region. In addition to a focus on localities this paper also offers insights on how cities cope with climate change in a regional setting. The research offers insights into a way in which regional and local climate change policy, capacities and practices can be analyzed by using a conceptual framework, mainly consisting of ‘process indicators’ on which local capacity of climate policy can potentially be assessed.

This paper is structured as follows. In the next section we present a literature review on cities and regions building capacities to cope with climate change. We present a list with factors that are theorized to have a positive impact on local climate change policy and capacities. In section 3 we present the research design and methodology of this study. In sum, four case studies of local climate policy in cities were conducted, compared and analyze. In section 4 we present the results of the case studies and compare them. Next, in section 5 (‘discussion’) these results are reflected upon, and positioned in an academic debate. The paper is finalized with a concluding section in which the central research questions are answered and propositions for a new research agenda are proposed.

2. Literature review on cities and regions building capacities to cope with climate change

There is a growing body of literature that examines the role of city governments in addressing climate change (cf. Bulkeley and Betsill, 2003; Bulkeley and Betsill, 2005; Betsill and Bulkeley, 2006; Kern and Bulkeley, 2009, Bulkeley, 2010, 2013; Hoppe and Van Bueren, 2015). Part of

this literature deals with attempts to explain the variation in what local governments do in respect of climate change. In this section drivers local climate policy will be introduced.

2.1 Drivers for local governments to adopt and implement climate policies

A famous notion on local governments adopting and implementing (proper) climate policy was made by Bulkeley and Betsill (2003) listing five preconditions, viz., : (i) presence of a committed individual in a local-level government that (ii) manifests a solid climate-protection policy (preventing GHG emissions), (iii) has funding available, (iv) has power over related domains, and (v) perhaps most crucially, has the political will to act. Although we adhere to most of these preconditions, the growing body of scholarly work on this matter learns that it is worthwhile to look into a broader set of additional drivers. They are presented in sub-sections 2.1.1-2.1.13.

2.1.1. Municipal size

A policy implementation perspective presents classical success and failure factors, such as the capacity of the implementing local government, the availability of information, and beliefs held by the participants in the implementation process, and the power exercised by stakeholders. All of these factors appear related to municipal size. There is a strong positive relation between municipal size, availability of knowledge, and degree of professionalization and experience (that local government's civil servants) have with the adoption and implementation of environmental policies (including climate change) (Kern et al., 2004; Hoppe and Coenen, 2011).

2.1.2. Policy: goals (ambitions and vision) and action plans

Climate action, in particular low carbon initiatives require the presence of a vision on which local government and local parties can target their strategies. Based on the end-goal in the vision plans and roadmaps can be developed on how to attain pre-set goals. Local governments can provide the institutional framework conditions under which climate policy and practices can be designed and implemented (cf. Späth and Rohracher, 2013). Having visions and goals, however, does not mean that they are shared from the outset with local communities and other important local stakeholders. Initially it is rather trusties and committed partners with whom strategic information is shared (e.g., Hoppe et al. 2015).

2.1.3. Role of local government

Concerning the possible roles of cities in technical transitions, and using the results from the contributions to the thematic series, we reflect on the propositions offered by Geels (2013) that cities can act as primary actors enacting transitions and as seedbeds for radical innovations in the early phases of transition—including his warning not to overestimate the power of cities—in the overall energy system, since their role is often modest (as confirmed by Späth and Rohracher, 2013). Moreover, municipalities can have multiple roles in spurring low carbon and other climate change actions (e.g., Bulkeley, 2012; Hoppe and Van Bueren, 2015). Geels (2013) mentions three roles cities can have in low carbon transitions, viz. (i) as primary actors enacting transition

processes; (ii) as seedbeds and locations for testing, experimenting with and developing radical innovations (in the early phases of transition); and (iii) as an initiating ‘niche actor’ that is struggling to cope with defensive mechanisms by ‘regime actors’ with vested interests (who are trying to slow down or de-activate pro-climate action).

2.1.4. Presence of a ‘local catalyst’

The presence of a full-time expert, committed individual or clear, “local catalyst” (a “local firebrand”) is also seen a factor that spurs climate policy (Betsill and Bulkeley, 2003). This would be an active public official, such as a mayor or alderman, who safeguards the place of climate change on the local political and policy agendas (Coenen et al. 1999, Kern et al. 2004, Evans et al. 2005, 2006, Barrutia et al. 2007). We argue that next to being motivated and committed this person would also have above average skills in networking, process managing, niche managing and playing the role of policy entrepreneur to get climate issues on political and policy agendas (cf. Hoppe et al., 2015). The latter can be differentiated in policy entrepreneurs creating the conditions that will in the long term evoke ‘windows of opportunity’ and ‘carpe diem policy entrepreneurs’ who seize opportunities once they arrive (Massey et al., 2014).

2.1.5. Available knowledge and expertise

Availability of knowledge and professionalization of personnel is a key requirement for local governments in order to maintain a critical role in implementing climate policy. A sound knowledge base is required upon the technical and process-oriented factors that are at play. This cannot be left to consultants producing incidental reports, leaving local governments depended on market based knowledge production and without historical institutional knowledge. This is hard though, since climate (mitigation) matters are very complex and therefore difficult to ‘digest’ for novices such as civil servants (with time restrictions) and local political representatives. Moreover, continuation of knowledge is at risk when knowledgeable officers retire, and are replaced by others lacking this particular knowledge base (cf. Kern et al., 2004; Hoppe, 2013; Hoppe et al., 2014).

2.1.6. Involvement of local governments in pro-climate networks

Local climate change policy capacity and climate policy actions are more prevalent when municipalities participate in transnational municipal networks (Kern and Bulkeley, 2009). One could argue that proponents of international pro-climate change networks advocate climate change actions that can be undertaken by local governments, which encourages public officials or civil servants from local governments to adopt them and set progressive local climate policies. The claim is supported by statistical evidence (Hoppe and Coenen, 2011).

2.1.7. Multilevel governance

Cities do not stand alone when designing and implementing climate policies. Obviously they have to deal with the local citizenry and local parties like housing corporations/associations and

local industry. But on the other hand they are also heavily depended on support and framework structures offered by higher levels of government, like the provincial, regional and central government. Cooperation between city governments and higher levels of government is considered of great importance (cf. Späth and Rohracher, 2014; Hoppe et al., 2014).

2.1.8. Role of local politics

Having committed public officials (with political will to act) and city councilors advocating pro-climate action in local politics would theoretically resolve in decision-making in which pro-climate action are set on the policy agenda (Betsill and Bulkeley, 2003). However, if public officials or city councilors are opposed to climate change action (like many right wing and populists politicians are nowadays), chances for political support, hence conditions for setting pro climate issues on the local policy agendas are slim. In dealing with opposition by political actors, tactical maneuvering, framing of issues and debates, and sound political leadership are strategies that can turn the table (cf. Hoppe et al., 2015).

2.1.9. Available budget

Bulkeley and Betsill (2003) argue that local governments allocating substantial budget to create favorable conditions under which sufficient capacities and an institutional framework can be created to design and run pro-climate programs. The argument is that sufficient budgets would allow for hiring and training of staff, or allowing current staff members to spend more time on managing climate policy projects. In addition, more budget would also allow for contracting advisors and engineers to work on the technicalities of climate policy, or to host subsidy schemes that support the uptake of ‘no regret’- or low carbon options among local households or local industries (Hoppe et al., 2014).

2.1.10. Available earmarked subsidy schemes

To increase the intensity of efforts that local governments can make to design and implement local climate policies, intergovernmental policy support schemes can be used to build (earmarked) capacities. The use of such programs might offer a good explanation for differences between the level of efforts governments make in different nation states, as shown in the literature on the uptake of Local Agenda 21 (Lafferty and Coenen, 2001) and local climate change policy in the U.S. (Zahran et al., 2008) and in the Netherlands (Hoppe et al., 2014). In addition, sometimes support schemes in particular areas of climate change (mitigation) are offered, such as renewable energy support policy or competitions organized to stimulate local communities to become low carbon communities (e.g. ‘Klimakomune Saerbeck’ in Germany; Hoppe et al., 2015).

2.1.11. Presence and support of local citizens’ initiatives

Civic capacity’ is conceptualized as the presence of environmental groups and the involvement of environmental causes. Environmental groups can mobilize capacity and political support to raise

attention to climate change-related issues and influence local policymakers' agenda-setting. The involvement of environmental groups in agenda-setting is of critical importance in the development of climate change policies (Zahran et al., 2008). Enhancing civic engagement (to empower environmental groups) is therefore considered a key challenge to climate change mitigation in cities (Bulkeley et al., 2009; Bulkeley, 2013).

2.1.12. Overall commitment by local governments

Whereas local government public officials can have high ambitions, a sound agenda, and sufficient capacity in terms of staff, budget, knowledge and professional skills this does not automatically mean that local governments are also committed to meet these goals. For instance, the environmental (or climate) officer and his/her public officials might be advocating intensive pro-climate policies, but they are depending on collaboration by departments in other functional domains (e.g., in construction, spatial affairs, finance). When the other departments are not willing to cooperate, or when there is a lack of 'boundary spanning' (Bressers and Lulofs, 2010), attaining of policy goals becomes very difficult. In addition, success or failure also depends on collaboration with local citizenry or industries in co-production of public services or in partnerships (Bulkeley, 2013; Hoppe et al., 2014).

2.1.13. Contextual factors

Like with other policies the context in which a climate policy is implemented matters a great deal (Bressers and Kuks, 2003). This can, for instance, relate to geographical, geophysical and demographical conditions. However, for climate policy there are two issues that seem to matter in particular: (a) 'climate risk', and (b) 'climate stress' (Zahran et al., 2008). 'Climate change risk' addresses such factors as coastal proximity, ecosystem sensitivity, or proneness to flooding and other climate change-related risks. Ecological, social and economic risks are not distributed evenly geographically. It is municipalities that are the more vulnerable to these particular risks that benefit most from climate change (adaptation) action. Moreover, risk prone areas (having experienced disasters) are found to be more resilient than their less experienced peers (Van den Berg and Coenen, 2013). 'Climate change stress' relates to high levels of energy-intensive, carbon-based employment, solo-commuting with low urban density, and low levels of solar energy use, which means that from an economic perspective on transportation and energy use, carbon emission reduction becomes more costly for local communities (Zahran et al., 2008). In addition, climate policies are sometimes formulated because of the co-benefits they can bring cities in terms of lowering energy bills, generating more business activity and spurring job creation. Sharp et al. (2011) refer to this phenomenon as the so-called 'need-based scope'.

3. Research design and methods

In this section research design, case selection, data collection and data analysis will be presented.

3.1. Research design and case selection

This study presents an embedded case study of four cities in the Dutch Twente region. Like most case study research designs each case (a municipality in this paper) was studied in–depth paying attention to rich description of phenomena relevant to local climate policy (cf. Yin, 2001). The cases that have been selected for this study are based in the Netherlands, because Dutch municipalities and provinces have proven to have a long tradition setting local carbon emission reduction targets and making efforts to strengthen their capacities in local climate policy (cf. Menkveld et al., 2000; Hoppe et al., 2011). The region of Twente is situated in the eastern part of the Netherlands and is part of the province of Overijssel. Within this province, the region of Twente is the most urbanized, which allows this study to use cases that greatly vary in terms of rural and urban areas. Because the region of Twente has a relatively balanced variation between urbanized and rural municipalities, and therefore also a high variation in size, two urbanized and two rural municipalities were chosen for this study. The two urbanized cases selected are the municipality of Hengelo and Enschede with respectively around 81,000 and 159,000 residents. The two rural cases are the municipality of Tubbergen and Hof van Twente with respectively around 21,000 and 35,000 residents (CBS, 2013).

3.2. Data collection

Data used in this study concern policy documents and interviews. For each of the four municipalities, three interviews were conducted, and policy documents were collected. For each municipality a local public official (an alderman), a local civil servant, and a local citizen (active in a community energy initiative) were interviewed. The total number of interviews was twelve. For the interviews a semi-structured approach (questionnaire) was used in order to have “a list of specific questions but leaving sufficient room for additional information” (Van Aken & Bij 2007: 135).

3.3. Data analysis

After policy documents were collected and interviews have been conducted, an initial set of data emerged. In order to see how the selected municipalities approach local climate change policy, based on the theoretical claims and conceptual notions (see section 2; sub-sections 2.1.1-2.1.13) data were critically reflected upon with repeating attempts of data analysis- and interpretation. For each four cases case study reports were drafted. In addition data were analyzed using CAQDAS, in this case Atlas.ti. Based on the CAQDAS analysis results per theoretical criterion (the ones in section 2) were analyzed, in particular comparing the four case studies in terms of commonalities and dissimilarities. Appendix A offers insight in how the comparison between the four municipalities in terms of assigning (qualitative) scores was established.

4. Results

In this section the case descriptions and results of the comparative analysis are presented.

4.1.1. *The City of Enschede*

Enschede is an urban municipality located at the south-eastern part of the Twente region. The municipality has a surface-area of 143 km² (CBS, 2012), counts 158,627 residents that live in the city of Enschede, which makes Enschede Overijssel's biggest city and the 11th Dutch municipality in terms of population (CBS, 2013). Economically, Enschede used to depend heavily on the textile industry since the 1860s with a working population of 85%, but collapsed in the 1960's, which led to an explosive unemployment increase. However, Enschede managed to recover this economic crisis with the arrival of a university (University of Twente), an academy (Saxion), important healthcare facilities such as 'Medisch Spectrum Twente' (MST), together with huge financial state investments in the industry- and service sectors, which resulted in the construction of many offices near the train station and an expansion of Enschede's shopping centre (Enschede onze Stad, 2014)(Enschede: Stad van Nu, 2014). In the 1990s, a plan was developed to merge the municipalities Borne, Enschede, and Hengelo into one municipality 'Twentestad,' but was not implemented after results from a referendum in Hengelo showed a lack of citizens' support. By 2014, the city councils of Almelo, Borne, Enschede, and Losser decided to centralize several municipal departments, such as communication, legal affairs, and human resources. This merge is called 'Inter-municipal Management Organisation' (Tubantia, 2014).

In 2010, Enschede published a long-term sustainability vision called 'Nieuwe Energie voor Enschede', which formulates a long-term municipal vision that is aimed to specify and accelerate an energy-oriented approach to mitigate climate change. This vision has been determined by the municipal council on 16 November 2009 and focuses on mitigating climate change impacts with CO₂ emission reduction and using sustainability as an investment to generate economic opportunities that improve employability, school buildings, education, and further regional collaboration between municipalities in Twente and innovative partners such as 'Twence', housing associations, the University of Twente and the Saxion university of applied sciences. In 2010 a consultancy firm was hired to assess the municipality's current sustainability policy (of which climate change policy forms a major part), and provide suggestions for future policymaking. The report that resulted from the firm's assessment concluded that the municipality of Enschede needs to further accelerate and sharpen its climate- and energy policy to reduce CO₂ emissions in such a way that low carbon goals can be met, in fact becoming a 'climate-neutral' municipality. Following this advice a policy goal was set that targets a 28% CO₂ reduction in 2020 as compared to 1990. Moreover, by 2020 renewable energy sources should account for 17% of local energy demand (in 2013, after a policy evaluation, these goals were adjusted to a 30% reduction in CO₂ emissions and 20% renewables in the local energy demand). In line with its depoliticized, managerial way of designing sustainability policies, this agenda-setting process fully depended on professional expert knowledge by the consultancy firm (which

had been contracted by the municipality for years), leaving aside local stakeholder and citizen knowledge that could have potentially been used as well (Kokkeler, 2012). The action plan that followed from the municipal vision holds seven key policy areas to which action have been assigned: sustainable construction, spatial planning, municipal organization, sustainable energy, citizen participation, mobility, and industries and companies. A big drawback towards policy implementation was a lack of budget, as the municipality faces a structural problem in cutting budgets.

In 2014 The Municipality of Enschede became a signatory of the Covenant of Mayors, showing commitment to an international treaty on lowering carbon emissions. The municipality also wants to explore the possibilities to set up a citizen-led energy cooperative in Enschede using benchmarks from other currently successful local citizen-led energy cooperatives elsewhere in the Twente region (e.g., Energiek Vasse, Energieneutraal Noord-Deurningen, ECHT). A trainee was tasked to further this policy action line. In the past municipal budget was used to help citizens set up local sustainability initiatives. Most municipal investments in local initiatives are small and usually concern need for support in information and communication.

Regarding commitment to its plans – in particular the ‘Nieuwe energie voor Enschede’ vision - achievements that were mentioned in the temporary evaluation report (2012) concerned: becoming a frontrunner in terms of energy-saving and a huge increase in green electricity production; more than 1,200 sustainable houses in 2012; pilot-projects that stimulate energy-neutral districts, sustainable schools and waste-separation; a manifesto was to be signed that aims to realize more sustainable and clean primary schools; the municipal organization uses primarily green energy and green grass as energy supply, and is on its way to become energy neutral in 2015; recycling of Twence’s (a waste incineration company producing ‘renewable energy’) residual warmth to green energy has majorly increased sustainable energy supply for Enschede. Although the ‘achievements’ give a promising impression one can wonder whether these ambitious goals were actually met in practice.

Regarding climate change adaptation the municipality of Enschede focused mostly on preventing water-related problems (which the city experienced a few times in recent years with extreme precipitation events). Although mitigation of water problems is mentioned in the City’s 2014 government agreement (mentioning urban citizen agriculture, green area management by citizens) climate change adaptation is not explicitly mentioned. Moreover, the plans reveal the priorities on budget cuts as a reason to shift tasks from local government to citizens. Although the municipality’s involvement in climate change adaptation is moderate, in 2014 the municipality of Enschede joined forces with other cities in the province of Overijssel and the water boards to participate in the so-called ‘Climate active cities’ initiative. Despite its inclusive name this initiative solely focuses on (water-related) adaptation while neglecting mitigation actions, and ‘no regret’ options.

4.1.2. The City of Hengelo

Hengelo is an urban municipality located at the central-eastern part of the Twente region, surrounded by municipalities Enschede, Oldenzaal, Borne, Hof van Twente, and Haaksbergen. Hengelo's surface-area is 61.83 km² and has 80.952 residents. It is the second largest municipality in the Twente region. In the 19th and 20th century Hengelo was an important location in the metal industry including big industrial such as the machine factory plant 'Gebr. Stork & Co.'. This led to economic prosperity until the metal industry plummeted. In an attempt to have a fusion between the municipalities of Borne, Enschede, and Hengelo into one municipality - which was to be called 'Twentestad,' - a referendum was organized, which led to Hengelo abandoning this idea. Despite this history, Hengelo does collaborate with other Twente region municipalities like Almelo, Borne, Enschede, and Oldenzaal in what is known as 'Netwerkstad Twente,' ('Network City Twente'; Stedendriehoek MONT, 2014). This network also embeds a platform in which climate officers from Twente's municipalities meet, and share best practices. In the Twente region for the last decade the City of Hengelo has held the reputation as the municipality most active in climate change policy. For instance, a national monitor on local sustainability capacities (the 'Local Sustainability Metre') has indicated Hengelo as being progressive in designing local climate policy (COS, 2009).

The Municipal coalition agreement for the 2010-2014 term recognizes the need to have a future resilient, sustainable Hengelo in terms of social climate, social facilities, and a local economy. Climate change policy is embedded in a broader sustainability policy agenda. One of the three focal issues on the sustainability agenda is 'climate & energy'. Each of the focal issues is described with short-term goals (<2015), mid-term goals (<2020), and long term goals (< 2030). It also involves participation by key local stakeholders. In terms of the 'climate & energy' focal issue, goals include realization of sustainable constructed houses that supply energy, sustainable mobility, and a 100% carbon neutral industrial park (called 'Twenthekanaal'). Local government focuses on improving the local district heating system's sustainability and independence, and implementation of energy efficiency policies. For instance, municipal buildings are set to have a 20% energy consumption reduction, and by 2020 mobility should account for 30% less carbon emissions as compared to 2007. By 2020 40% of energy consumption should come from renewable energy sources. And 30% of public lighting should come from renewable sources. Moreover, 250 self-sufficient energy households are envisaged, to go with 1,000 dwellings that are retrofitted with high quality thermal insulation materials. In addition, a citizens initiative 'Duurzame Energie in de Wijk' should be realized, accounting for 30% less fossil fuel use in households as compared to 2007. Moreover, the use of sustainable vehicles is stimulated among Hengelo's populace. Whereas the municipal policy mentions a reduction in carbon emissions it does not express a commitment to attain specific quantitative targets. Hengelo's municipal council is committed to deal with climate change, but only municipal projects with a reliable payback-time or big, long-term projects are likely to get approved.

Hengelo wants to play a collaborative, facilitating role with regards to society and organizations, which is also shown in its title 'Investeren in Verbinding'. Collaborative governance is about

defining the frame for Hengelo's future vision with clear agreements, expressed commitment, and is realized in deliberation with public official organization, citizens, institutions, and organizations. In order to improve collaboration, the City of Hengelo focuses on citizen participation, a transparent, dynamic relation with the council, clear partner agreements, and effective collaborations with neighboring municipalities, 'Netwerkstad'-partners, 'Regio Twente', and the province of Overijssel. Within these collaborations, Hengelo will focus on sustainable housing, spatial planning, stimulating dialogue, awareness, skills, knowledge, the reduction of carbon emissions combined, and the use of more renewable energy. The increase of sustainable housing involves specific arrangements with housing associations. In order to make houses more sustainable, green-deals are being made. In realizing the sustainability agenda's mitigation goals, Hengelo's main strategy is to focus on collaboration with partners. Instead of a previous strategy that focused on lowering environmental tax, Hengelo's new insights, knowledge, and technology makes Hengelo act more from a holistic approach where all chains are connected, which is believed to result in real solutions.

In the coalition agreement for the 2010-2014 term, Hengelo mentions the need to cope with the impacts of climate change and therefore includes the ambition to increase Hengelo's district water containment within their spatial planning agenda to re-structure and improve district quality. 'Climate adaption' is mentioned in the agenda's 13th theme. Over the last 20 years Hengelo has had a policy focus on protection against flooding and coping with drought. The municipality of Hengelo wants to play an exemplary role to limit climate change stress with the goal to make the city-centre more sustainable. It focuses on green urban areas that contributes to biodiversity, and cope with occasional flooding and urban heat-stress. A budget has been allocated to the water department. In the plans Hengelo's citizens are mentioned in terms of citizen initiatives who can improve green-structures, increases awareness, increase use of sustainable roofs to contain water (and can serve as roof space for solar PV generated electricity). In addition, a broadened municipal sewer plan for 2013-2017 was formulated in 2012 from the legal obligatory duty to improve sewer- and water facilities in order to deal with floods. In the coalition agreement for the 2014-2018 term the ambition is expressed to increase stream space and a more natural environment. A project called 'the climate-adaptive city' aims to inform citizens about current mitigation or adaptation actions. Hengelo currently participates in a project to find innovative rain water storage solutions. It recently constructed a 'seasonal Wadi', which is however a potential risk factor in relation to attracting malaria mosquitos.

With regards to climate change mitigation, a municipal 'sustainability team' (consisting of civil servants) pushes the climate mitigation agenda, which resulted in a more sustainable-oriented coalition agreement. Within the Twente region the City of Hengelo is renowned for having active pro-climate civil servants and on occasion progressive public officials that spur a pioneering role of the municipality in climate change policy. The sustainability team is responsible for realizing the sustainability agenda, focuses on policy, education, communication, and is specialized in the area of energy and sustainable mobility. The sustainability team also aims to improve citizen

involvement in climate themes on behalf of the municipality. Most of the municipal departments that were involved formulating climate change policy (such as water, waste, spatial planning, and nature) have pro-climate oriented officers. However, approaches are still fragmented and public officials face problems when translating ambitions into (feasible) policy goals and action plans. When ambitions reach spatial planning issues in concrete projects difficulties to maintain climate goals on the agenda occur. Network participation is seen as an important way to share information in order to save time and money for other policy goals. On a regional level, Hengelo participates in an environment- and sustainability meeting for public officials to improve a multi-disciplinary sustainability approach. On a provincial and national level, Hengelo does participate in seminars and workgroups, but prefers participation on a regional level. European network-meetings organized by ICLEI and Covenant of Mayors are considered as useful by Hengelo officials and are attended by civil servants. In terms of climate change adaptation, regional meetings are being held, which led to a water-network project and support was found for the municipal sewer plan due to regional meetings between public officials.

Like most other Dutch municipalities the City of Hengelo is subject to severe budget cuts. As such it also has an impact on (earmarked) budgets for low carbon and energy-related projects (e.g., the large-scale district heating project in the Southern part of Hengelo). Moreover, the City of Hengelo has little budget for climate-oriented goals. As a response to the lack of budget, Hengelo has learned to play an intermediate, multi-sectoral role for companies that are able and willing to invest in, usually mainstream, sustainability projects, which allows for interesting collaborations that led to new, more efficient solutions. The City of Hengelo is active in seeking support for climate change plans from other governments. Most of the low carbon energy projects are initiated from a provincial level, although they are implemented depending on the project's time, planning, and policy conditions. Accepting a provincial project also means less control over the project, which increases the risk of unreliability towards citizens. The City of Hengelo's climate change adaptation policy reflects national policy and is believed to be in good shape.

4.1.3. The municipality Hof van Twente

Hof van Twente is a rural municipality located at the central-south of the Twente region, has a surface-area of 21,541 hectares, and is the result of a fusion in 2001 between the municipalities Ambt Delden, Diepenheim, Goor, Markelo, and Stad Delden. The municipality has 34,997 residents registered that live in one of its six villages: Bentelo, Delden, Diepenheim, Goor, Hengevelde, Markelo, and thirteen townships. In 2010, a future vision document called 'Zicht op 2030' ('View on 2030' in English) includes the goal to improve sustainability, which is seen as an increasingly important factor for decision-making in politics, industries, institutions, and citizens, and has an increasingly solid position in law- and regulation, policy, and implementation. Within the sustainability agenda most emphasis was with waste management. The main reasons mentioned to invest in sustainability were to improve the environment, social cohesion, and Hof van Twente's local economy.

The first policy theme focused on ‘climate and energy’ where the goal is to realize a climate neutral municipal organization within 2011 and 2020, and a carbon neutral municipality in 2035. The municipality focuses on a broad collaboration between companies, other governments, and local citizens where Hof van Twente plays a facilitating role with more policy room for innovative ideas. There is a focus on mitigating the use of fossil fuels, lower carbon emissions, and to increase the use of sustainable energy. Another theme is completely dedicated to sustainable construction and living, where sustainable construction is seen as an inevitable goal that contributes to a climate-neutral municipality within 2011-2020. In terms of goal determination, national performance cards with concrete goals derived from the ‘climate treaty’ (‘Klimaataakkoord’ in Dutch) between the Dutch state and Dutch municipality union (VNG) are used for policy making. Commitment from citizens and companies is sought to realize an energy-neutral municipality. Communication is seen as an important policy instrument to inform citizens and companies about ways how they can contribute to a sustainable environment. Spatial planning should also contribute to the development of a sustainable environment, which is interpreted as ‘having an acceptable living climate.’ Policy actions are monitored versus their performance and progress.

Hof van Twente also formulated a long-term executive program called ‘MUD’ (Meerjaren Uitvoeringsprogramma Duurzaamheid), which is the result of a policy sub-program called ‘sustainable municipality’, which originates from the strategic sustainability policy program called ‘programma duurzaamheid.’ The document has been created by a third party consultancy firm that is specialized in formulating energy advice for rural areas. Different stakeholders were consulted for their ideas, such as entrepreneurs, energy companies, policy makers, aldermen, council members, housing cooperatives, and village councils. MUD’s aim is to encourage citizens and companies to contribute to sustainable developments with a focus on realizing short-term goals. One of these goals is a 20% energy reduction for the municipal organization and a 10% decrease for citizens. Long-term goals focus on an energy-neutral municipality in 2035 and an energy-neutral municipal organization in 2030.

The local government focuses on sustainable houses, which are obligatory in 2020, energy-saving, sustainable energy, sustainable agriculture, and mobility. In terms of sustainable energy, there is a focus on local energy production, which will generate an economic impulse. Pilot projects are implemented and investments are done in retrieving subsidy for energy- and climate projects. In terms of sustainable energy production. With regards to sustainable construction, arrangements are made with housing cooperatives for more energy-efficient, climate-resilient municipal buildings, new houses, and in the future current houses as well. In realizing this, a national construction framework is used to assess each project on EPC-values (energy performance coefficient), and energy-saving measures should be 10%-20% more efficient than the legal conditions. To stimulate sustainable mobility, each new municipal vehicle will have an environmental-friendly label and preferably drives on renewable fuels. Research is done to explore possibilities for a re-charge point. Also, bio-fuels and alternative fuels from tank stations

within the municipal area are stimulated in deliberation with concerned tank stations. Livestock holders are encouraged to produce biogas via co-digestion, and to establish wind turbines. Furthermore, a smart-meter implementation plan is envisaged in the five municipal districts that have the highest energy consumption. They will be motivated with a competition where the district with the most energy-savings after one year, will receive a prize (in the form of a barbeque for the inhabitants financed by the municipality).

In terms of energy production, sustainable energy is stimulated with information, an exemplary role, low-interest loans, citizen and company involvement, and a start-subsidy for their local energy corporation. Bioenergy production from firing of wood is stimulated with an explorative business-case, and a facilitative role for citizen and company investment in wood-boilers. Bioenergy production from manure processing is stimulated with a facilitative role with possible space in the municipal allocation plan. Wind energy is stimulated for small-windmills on local business terrains, but large-scale exploitation of windmills has insufficient council-support and will therefore not be stimulated. Geothermal energy is stimulated with an exploration of possibilities to formulate soil-warmth policy. Shale gas and coal gas are discouraged due to uncertainty of profitability and its impact on the environment. Energy crops are neither stimulated, because agricultural land is scarce and prefers production of food, livestock, and fiber or bio-plastic supply. Energy-saving is stimulated with 350 ‘smart meters’ for most energy-demanding five districts in collaboration with energy suppliers and energy cooperative, an awareness increase of energy-saving school material, and a policy plan, initiated from Hof van Twente’s citizen panel, is formulated to realize more efficient street-lighting and lighting in municipal buildings for the 2013-2018 term. Thermal insulation of dwellings is stimulated with more focus on house-owner awareness, minimizing most energy-demanding five city districts, and active stimulation to participate in the energy fund that facilitates citizens in realizing sustainable measures. The uncertainty of feasibility, profitability, and affordability that characterizes climate-related projects and initiatives, make it extra important for the municipality to have a municipal council that is committed to implement climate policy. Hof van Twente has a municipal council that continuously supports the sustainability agenda and also initiates ideas, which create fruitful, positive internal dynamics.

Within the Twente region, Hof van Twente participates in the ‘Environmental and Sustainability’ network that is a regional deliberation meetings between ‘Twente’ municipalities, which are held on a civil servant and governance level, and are aimed to share, discuss, and fine-tune local climate policy on a regional level. On a more national level, Hof van Twente is member of a Dutch climate treaty, which is called ‘Klimaatverbond’, which is a network that consists of more than 150 municipalities, provinces, and water boards that agreed to collaborate in order to realize an energy-neutral society through environmental- and sustainable-oriented projects and lobby. As a member of the UN’s Millennium network, Hof van Twente also commits itself to the 7th Millennium Development Goal, which focuses on ensuring environmental sustainability with the commitment to reduce carbon emissions. With regards to climate change adaptation networks,

Hof van Twente's former alderman was a member of the VNG-commission with regards to water management.

The local government applied for the SLOK-program (multilevel governance capacity building program targeting municipalities; c.f. Hoppe et al., 2014), but eventually declined participation, because the grant application was deemed too complicated. It would provide little money and the accountability was perceived as unclear. In terms of providing subsidy for climate initiatives, the municipality Hof van Twente plays a less prominent role due to a shift in subsidy-allocation from municipality to higher governance levels, such as the province or the state. For instance the municipality participates in 'sustainability program' by the Province of Overijssel in which both decentral governments financed 1M Euros (which was used to spur solar PV panel adoption among citizens and replace asbestos rooftops of firm's properties). Furthermore, together with the province, Hof van Twente subsidized public schools for teaching material, and financed seed money to a local citizens' energy cooperative 'ECHT' (to develop a website of its own, folders, and to organize local meetings). ECHT focuses on increasing energy efficiency in dwellings, and installing solar PV- and thermal systems (for instance in locations that are not used like old business parks). ECHT explores to what extent they can take over responsibilities from the municipal's' energy panel, but chances are small because it would take away jobs from civil servants and it is difficult to ensure a reliable service from voluntary workers. Another initiative from ECHT is to appoint local ambassadors, who are citizens that were a pioneer for a certain sustainability activity within their local neighborhood and with their experience can help out interested neighbors accomplish the same goal. The 'local ambassador' concept has been benchmarked from the municipality of Amersfoort and is currently being implemented in a few districts in Hof van Twente to see whether it works in this municipality as well.

In terms of climate change adaptation, Hof van Twente's future vision document focuses on the preservation of drink water, a minimal production of waste water, water for nature and recreation flood protection and water storage in case extreme droughts occur. Municipal water policy is based on the water law, focuses on having a vital and robust water-system and water-chain and is stimulated in order to deal with climate change impacts such as flood risk, waste water, rain water, and ground water. While Hof van Twente has no specific climate change adaptation policy, their current environmental policy document does express an ambition to deal with floods and organize water adequately. Also, a sewer-policy was formulated in order to build sewer-systems that help store, filter, and transport water. The MUD policy, however, does not mention climate change adaptation goals separately. For many water-related issues the municipality is depending on the Water board ('Vechtstromen').

4.1.4. The municipality of Tubbergen

Tubbergen is a rural municipality located in the North of the Twente region. It is located at the border to Germany and has a surface-area of 14,741 hectares. The municipality has 21,215 residents registered that live in one of its 10 villages: Albergen, Fleringen, Geesteren,

Harbrinkhoek, Langeveen, Manderveen, Mariaparochie, Reutem, Tubbergen, Vasse (and the three hamlets of Haarle, Hezingen, and Mander). Although the municipality is home to agricultural economic activity it also hosts plenty of touristic activities due to esthetic landscaping. Since 2011 the municipality of Tubbergen collaborates intensively with the neighboring municipality of Dinkelland, in public service provision/delivery (e.g. in environmental permit systems). The collaboration, a partnership called 'Noaberkracht' was developed in response to the challenge of demographic decline, governance-related developments, and to cope with lack of capacities and expertise.

Tubbergen's coalition-agreement for the 2010-2014 term focuses on stimulating the use and production of sustainability techniques, such as: solar panels, ground heat, and bio-energy. Based on an energy audit conducted by the waste company 'Twence' in 2011 potentials for solar energy and bio-energy were identified for Tubbergen. However, this should be balanced against economic and ecological goals. Like many other municipalities in the region Tubbergen (and Dinkelland) stress improved waste management (a priori waste separation; the so-called 'diftar' method) in sustainability policy. In 2013 Tubbergen developed a waste policy vision document that aims to realize a waste-free municipality with a cradle-to-cradle economy that contributes to the mitigation of carbon emissions and to new economic opportunities. Tubbergen's coalition-agreement for the 2014-2018 term focuses on sustainable social effects to realize vital and livable villages in terms of environment, social dynamics, local economy, and safety. Within the chapter 'economic power and jobs' Tubbergen expresses the commitment to improve Tubbergen's development in sustainability in order to decrease energy costs and improve a healthy environment. Commitment to sustainable energy is expressed, but does not include a specified goal.

While the basic attitude of public officials towards climate change issues is experienced as rather positive, they do tend to be conservative and reactionary when it comes to actual dealing with climate change developments. The drive to set up local climate policy is mostly externally driven and topic-specific, in which the policy is not part of an over-arching climate policy document. Also, climate goals have not yet been integrated in other policy domains. The municipality hired a consultancy-firm to represent the municipality's energy-panel where they share information about energy with citizens and companies (via the so-called 'energy front office'; 'energieloket' in Dutch). The municipality of Tubbergen currently does not have a clear vision regarding climate change.

Political priorities in Tubbergen are typically with protection of agri-economic activities given the importance of livestock holders' firms in the local economy. Due to a lack of political support, public officials do not have enough time, manpower, or money to focus on other activities than the obligatory climate goals that have been set on a regional, provincial, national level. While a budget can be seen as an obstacle in finding creative solutions, the municipal budget of Tubbergen to deal with climate change issues is currently quite low. The low budget for climate policy in Tubbergen is also resembled in the titles of both the climate-oriented

policymaker and alderman, in which the policymaker has ‘environment, sustainability & waste’ in its agenda, and the alderman ‘healthcare, finance, sustainability, waste, energy, innovation, and social real-estate’. In the 2010-2014 term the municipality of Tubbergen did not have a public official who took a leading role in committing to the implementation of sustainability policy. From an interview it was retrieved that a sustainability-oriented civil servant believed that he should fulfill this role, but due to a lack of support there is not enough time, manpower, and money available to make this happen. In addition, he stated that he believes that the newly elected alderman would be more committed to the sustainability agenda than his predecessor.

The municipality of Tubbergen plays a stimulating, facilitating, and exemplary role in realizing sustainability initiatives to realize less energy costs and a healthier environment. This is done with project area development and finding a balance between economic, ecological, and social interests. More sustainable energy will be realized using the energy panel and with a facilitative role in realizing sustainable initiatives from society, but Tubbergen will not invest in energy-saving measures or green energy supply.

The municipality of Tubbergen plays several roles to improve climate change mitigation. An informative role is played in which the municipality has set up an energy-panel to increase sustainability living awareness amongst the public. The municipality is also an informant of the impacts and solutions with regards to climate change informs citizens and companies of currently available subsidy-programs, and advises how buildings can be exploited more cost efficiently with the use of sustainable energy. The municipality also plays an intermediate, facilitating role in which the municipality uses its network to help, for example local citizens’ energy cooperative ‘Energiek Vasse’, deal with smart-grid legal obstacles by involving Cogas (DSO) and research institutions in the process. A platform called ‘Oans’ was established to facilitate citizen participation, which allows citizens to share their climate-oriented idea’s with the municipality, which creates more potential for the municipality to implement citizen-supported idea’s that help Tubbergen deal with climate change. Furthermore, the municipality of Tubbergen plays an exemplary role with the construction of solar-panels on the municipality building’s roof, the decision to make public sport-accommodations climate-neutral, and investments in sustainable living awareness in response to outcomes of an energy audit. The municipality of Tubbergen also plays several roles to improve climate change adaptation. An informative role is played in which a, legally mandatory, water-panel has been set up in response to their published sewer-plan.

Because the municipality of Tubbergen has only limited budget available, climate actions depend for a large extent on subsidies granted by other governments. For instance, the Province of Overijssel, which provides budget for the energy panel, and budgets to local energy initiatives, in particularly in the village of Vasse (following the ‘Sustainable village’ competition in which Vasse and Fleringen won prizes which led to financial support by the Provincial government). ‘Energiek Vasse’ aims to become energy-neutral with increased energy-saving, local energy production and citizen/company awareness, where profits are reinvested in their local community (Wij zijn ‘Energiek Vasse’, 2014). Although the citizen-led energy cooperative is ambitious itself

(indicated by having realized a solar PV park on the rooftop of the local community centre using finance from the local community, without any governmental support), an interviewee stated that actual implementation of the initiative's plans depends to a large extent on the support by local government: this would mean committed mayor and civil servants who are willing to support citizen-led initiatives. Based on two years' experience these conditions were not met. When projects were suggested by the initiative (e.g. construction of wind turbines, and installation of solar panels on schools' rooftops) civil servants and the mayor reacted reserved. Instead of empowering the citizen's cooperative they rather focused on continuation of their own energy actions (e.g., an energy audit and 'vision'; the municipal energy panel). This led to many progressive pro-climate citizens having developed skepticism toward the (hardly supportive) role of local government. However, the new coalition has expressed the ambition to stimulate citizen initiatives and a more supportive attitude from public officials is expected to be more supportive again.

Climate change adaptation goals are not specifically addressed by the municipality of Tubbergen. Climate change is not perceived as an urgent issue that requires adaptive capacity by the municipality. However, it has been assigned basically to water policy. In 2013, Tubbergen and Dinkelland formulated a legally mandatory, sewer plan in consultation with the water board. The plan confirms legal requirements for their current sewer maintenance are met. One of the sewer plan's goals is to cope with the increasing frequency of rain water, waste water, and soil water surplus in the urban areas due to extreme weather events. In order to realize the sewer plan's goal to deal with extreme weather events, the City of Tubbergen focuses on a collaborative approach within the municipal organization and with the water- and purification managers within the scope of the current sewer tax. Research was to be conducted to determine what the municipalities and the water board should choose to deal with extreme weather events. A 'water panel' was used to deal with companies' and citizens' questions and statements. Sewer-tax is expected to increase each year by 4% due to necessary sewer renovation or sewer replacement. The climate adaptation policy actions are mostly coordinated by the water board, not the municipality of Tubbergen itself.

4.2. Results of the comparative analysis

In Table 1 the results of the comparative analysis are presented in qualitative terms ranging from '++' (as very progressive) to '—' (as poorly progressive). From the comparison it can be retrieved that the municipalities of Hengelo and Hof van Twente perform relatively well in terms of progressive climate capacity, whereas Enschede, and in particular Tubbergen perform less well. Whereas the municipality of Enschede has set ambitious pro-climate goals and policies, it appears little committed. As a 'small' municipality Hof van Twente appears relatively progressive amongst its peers of small, rural municipalities, having a relatively active, and committed approach to climate change challenges.

Table 1: results of the comparative analysis.

	Enschede	Hengelo	Hof van Twente	Tubbergen
Municipal size	++	++	-	-
Policy: vision and goals CC Mitigation	+	++	+	--
Policy: action plan CC Mitigation	-	++	+	-
Policy vision and goals CC Adaptation	-	++	+	-
Policy action plan CC Adaptation	-	++	+	-
Commitment	+/-	++	+	
Presence of a 'local catalyst'	-	++	+	+/-
Available knowledge and expertise	-	+	+	--
Involvement of municipality in pro-climate networks	+	+	+	-
Multilevel governance	+	-	+	++
Role of local politics	+/-	+	+	-
Available budget	-	+	+/-	-
Available subsidy schemes	-	+	-	-
Presence and support of local citizens' initiatives	-	-	+	+

5. Discussion

In this section we position the results of comparative study in ongoing academic debates on climate change capacity of local governments.

First of all, we wonder whether Bulkeley and Betsill's claims (2003) hold, viz. (i) presence of a committed individual in a local-level government that (ii) manifests a solid climate-protection policy (preventing GHG emissions), (iii) has funding available, (iv) has power over related domains, and (v) perhaps most crucially, has the political will to act. We found this does hold for all of the municipalities we analyzed. However, it does hold for the city of Hengelo, but less so for Hof van Twente. Nonetheless, broadly speaking the claims hold when confronted to the four Twente cases. Moreover, no evidence was found that municipal size matters.

Regarding the ‘Mitigation-adaptation dichotomy’ (Biesbroek et al., 2009)? Although there is recently more attention to adaptation by local governments mitigation still appears to dominate local climate policy agendas (in line with Hoppe et al., 2014). Moreover, local governments are becoming more active in this field, not leaving it to the ‘water boards’ only. Intensiveness of local climate adaptation policy appears to be in line with policy intensiveness of local climate change mitigation policy.

In the four municipalities that were studied there appeared to be little attention to ‘no regret’ options, which address both adaptation and mitigation actions. This is in line with findings by Runhaar et al. (2013) and Uittenbroek et al. (2014).

Regional collaboration on climate issues was found in the four cases analyzed, but was little intensive, nor progressive. In fact, only knowledge and best practices were shared, but we found no evidence of its positive contribution to local action in projects. Moreover, not different with past experiences it is the City of Hengelo that is still the most active in local climate change policy in the Twente region. Perhaps its experiences diffused to the neighbouring municipality of Hof van Twente, which led to its adoption of progressive climate policy. Notwithstanding this claim, there is little evidence in support of regional collaboration stimulating active local climate policy and capacity (in contrast to claims by COS, 2009; Hoppe and Coenen, 2011; on the Noord-Brabant provincial case). The same holds for the claim on local governments partaking in international pro-climate networks (cf. Kern and Bulkeley, 2009). Although the urban municipalities of Hengelo and Enschede appear involved, it is mostly influential on policy output (like the City of Enschede signing the Covenant of Mayors), but there was little evidence that it already led to positive effects in terms of policy outcome and local climate projects.

There was also little evidence of influence of earmarked subsidies by other (higher) governments on building local climate capacity (cf. Sharp et al., 2011). All of the four municipalities used the provincial scheme, and in the past used the SLOK scheme following the ‘Klimaatakkoord’ in 2006. However, although the provincial subsidy was used by all four municipalities great differences in capacity and output were found. Moreover, we also found evidence of a local government resisting earmarked subsidy schemes for the reason of maintain local control of climate agendas (in the case of Hengelo).

Finally, we want to stress that support of local community energy initiatives (addressing a claim on climate policy supporting citizens’ initiatives; Bulkeley, 2013) was rather poor, except for the case of Hof van Twente. It is in particular striking that the urban municipalities like Hengelo and Enschede appear little supportive of community initiatives (or: in the sense of little community activity taking place in the respective cities). We also found that support of community initiatives is downright negative in one of our cases (Tubbergen) as the community initiative only experienced resistance by the local government.

6. Conclusion

This paper started with the following research question: What does local climate change capacity mean in local governments when addressing both adaptation and mitigation?

Results show that municipalities in general lack sufficient budgets for climate change policy. Nonetheless, policies are ambitious are relatively high (except for the Tubbergen case). There is also a general lack of balance between climate change mitigation and climate change adaptation in local action plans. Moreover, only one out of four municipalities had a solid climate change action plan. This also holds for commitment to climate change goals, where a variation was found between municipalities. This appears not be related to any background determinants such as municipal size. In addition, membership of international pro-climate network appeared related to active local climate policy in a double-faced way: in terms of setting ambitious goals it does, but in hardly terms of capacity or policy implementation. Support of low carbon citizen initiatives appears to be low in the four investigated municipalities, except for one case of (the municipality of Hof van Twente). Moreover, it was only in the two rural municipalities that active citizens' initiatives were found. One of the two was not supported by local government at all. Finally, we found that there was networked collaboration between municipalities via a forum in which local climate change coordinators meet on frequent basis. However, no evidence was found in support of the associated benefits of networking.

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Appendices

Appendix A: Clarification of score card assignment per criterion and per case.

Criterion 1: Size (population density).

Enschede	Hengelo	Hof van Twente	Tubbergen
++	++	-	-
1112 residents per km2	1310 residents per km2	163 residents per km2	144 residents per km2

Criterion 2: Mitigation policy goals

Enschede	Hengelo	Hof van Twente	Tubbergen
+	++	+	--
Vision. In general ambiguous goals. Waste most specific.	Structured agenda that includes specific sub-goals	Ambiguous goals Structured in MUD doc.	Lacks vision. General, minimal goals

Criterion 3: Mitigation policy action plan

Enschede	Hengelo	Hof van Twente	Tubbergen
-	++	+	-
Plan for waste infrastructure for waste goal, but general plan for Co2 reduction is less clear	Plan for Co2 reduction with 13 sus. themes and specific procurement examples. Green deals. High conditions for warmth-net	Plan for Co2 most focus on agr. sector, stimulate business area's, and sus. construction. Initiatives district energy saving	Unclear collaborative strategy. Exemplary role: sport buildings Notable differences: no investments in energy-saving and sustainable energy supply in the upcoming term

Criterion 4: Adaptation policy goals

Enschede	Hengelo	Hof van Twente	Tubbergen
-	++	+	-
Concept water. Urban nature, water awareness, containment, and uncoupling.	Three policies. Urban nature, rural area, bio-diversity, water household, sus. agriculture, sewer, ground water, green core	Three notes. Vital and robust water system and water-chain	Sewer policy. Legal requirements for current sewer maintenance Low priority

Criterion 5: Adaptation policy action plan

Enschede	Hengelo	Hof van Twente	Tubbergen
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-	++	+	-
Business area's, city streams, urban agriculture for urban nature. Plan for evaluation and budget	Steering role business area's, city streams, urban nature, for water containment. Ground water contact and workshops	Business area's for water containment Balance economy ecology for vital and robust water system and water-chain. Budget, local systems, collaboration	Business area's for nature quality Balance economy ecology subsidy project and tree protection. Outsourcing

Criterion 6: Role of local government

Enschede	Hengelo	Hof van Twente	Tubbergen
-	+	+	-
Exemplary +	Exemplary +	Exemplary +	Exemplary -
Informative -	Informative +	Informative +	Informative -
Facilitative -	Facilitative -	Facilitative +	Facilitative -
Adaptation -	Adaptation +	Adaptation -	Adaptation +

Criterion 7: Presence of a 'local catalyst'

Enschede	Hengelo	Hof van Twente	Tubbergen
-	++	0	0
Catalysts in the past, no recent catalysts found No adaptation.	Sust. team engaged, waste dep. most catalyst. No budget, more creative. Water catalyst.	Potential of catalysing alderman who was catalyst in the past. Former alderman water catalyst.	More engaged alderman, but officials have lack of time and resources. No adaptation.

Criterion 8: Availability of a sound knowledge and expertise base

Enschede	Hengelo	Hof van Twente	Tubbergen
0	+	+	-
Integration and appointment, but not experienced on a citizen level. Adaptation: Mitigation/ Adaptation policy merge	Integration and sustainability team, but not experienced on a citizen level. Adaptation: experienced in water- and sewer policy	Sustainability expert, goals over regulations, experienced on a citizen level. Adaptation: No urgency, but water-test.	Mandatory, reactive, external knowledge. Adaptation: no urgency or improvement.

Criterion 9: Involvement of local government in pro-climate networks

Enschede	Hengelo	Hof van Twente	Tubbergen
+	+	+	-
Regional + National + International + Adaptation -	Regional + National - International + Adaptation +	Regional + National + International - Adaptation +	Regional - National - International - Adaptation +

Criterion 10: Multi-level governance (involvement with higher governments)

Enschede	Hengelo	Hof van Twente	Tubbergen
+	-	+	++
Commitment to high-level climate policy, but also narrow climate vision and goals. Adaptation: No approval water policy vision.	Committed to high-level goals where needed, but also reluctant and wants to keep control. Adaptation: policy plan in line with national level.	National level commitment as a guideline for opportunities on local level. Focus on energy. Adaptation: national policy and waterboard.	National level due to lack of vision. Minimal commitment due to lack of capacity. Adaptation: national policy and waterboard.

Criterion 11: Role of local politics in pro-climate issues

Enschede	Hengelo	Hof van Twente	Tubbergen
0	+	+	-
Coalition Diversity + Majority Coalition - Council Support + Adaptation -	Coalition Diversity + Majority Coalition - Council Support + Adaptation +	Coalition Diversity - Majority Coalition + Council Support ++ Adaptation +	Coalition Diversity - Majority Coalition + Council Support + Adaptation --

Criterion 12: Availability of earmarked budget for climate programs

Enschede	Hengelo	Hof van Twente	Tubbergen
-	+	0	-
Sufficient budget - Policy efficiency + Budget increase - Adaptation -	Sufficient budget - Policy efficiency + Budget increase + Adaptation +	Sufficient budget + Policy efficiency + Budget increase - Adaptation -	Sufficient budget - Policy efficiency + Budget increase - Adaptation -

Criterion 13: Local government using earmarked climate subsidies

Enschede	Hengelo	Hof van Twente	Tubbergen
-	+	-	-
Regional Subsidy + National Subsidy - EU Subsidy - Adaptation -	Regional Subsidy + National Subsidy - EU Subsidy + Adaptation +	Regional Subsidy + National Subsidy - EU Subsidy - Adaptation -	Regional Subsidy + National Subsidy - EU Subsidy - Adaptation -

Criterion 14: Local governments supporting community low carbon initiatives

Enschede	Hengelo	Hof van Twente	Tubbergen
-	-	0	+

Energy Corp. – Companies + Municipal support - Adaptation -	Energy Corp. - Companies - Municipal support - Adaptation +	Energy Corp. + Companies - Municipal support + Adaptation -	Energy Corp. ++ Companies + Municipal support - Adaptation +
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Criterion 15: Commitment

Enschede 0	Hengelo ++	Hof van Twente +	Tubbergen -
'Reimarkt' support and information project. Sustainable public buildings. Many achievements mentioned, but not specific and lack of argumentation. No adaptation.	Many specific examples of commitment in their three area's. Adaptation: many examples of commitment, with a focus on water and green-structure.	Investment in energy corporation and inspiration farm. Citizen participation with info-meetings, hof-panel, and collaboration with local initiators. No adaptation.	Initiative with province to stimulate citizen sustainable investments. Solar panels on public building roofs. No adaptation.