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Local government influence on energy conservation ambitions in existing housing sites—Plucking the low-hanging fruit?

T. Hoppe *, J.Th.A. Bressers, K.R.D. Lulofs

Twente Centre for Studies of Technology and Sustainable Development, Faculty of Management and Governance, University of Twente, Ravelijn, P.O. Box 217, 7500 AE Enschede, The Netherlands

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ABSTRACT

Greater energy efficiency can be achieved in existing dwellings thanks to longer lifecycles, slow replacement rates, and technical innovations. Many such dwellings are located in dense urban neighbourhoods, where urban renewal projects are undertaken. Local government can encourage the setting of ambitious goals as a stepping stone to realizing energy efficiency goals that achieve high levels of energy efficiency. The research question which this paper addresses is: to what degree do local governments influence ambitions to conserve energy in existing housing sites? To examine this issue, thirty-three sites in the Netherlands were studied using a quantitative analysis. The results show that collaboration between local authorities and local actors increases the level of ambition to conserve energy. However, local authorities intentionally selected sites with poor energy efficiency, so it would be easy to meet ambitious energy conservation targets. Collaboration between local authorities and local actors turns out to be the key factor in selecting those sites. Moreover, there is little sign of genuine ambition. This article contributes to the debate on energy conservation policies in local housing sites. The study provides starting points for systematic, empirical research into the realisation of energy conservation in existing housing, especially in large-scale refurbishment projects.

1. Introduction

Since the Dutch government committed itself to the Kyoto Protocol targets in 1998, climate mitigation measures have been on the national policy agenda. Climate policy in the Netherlands is organized along sectoral lines, with emission platforms and targets formulated for each industrial sector. One such sector is the built environment, which is responsible for 33% of national greenhouse gas emissions. The Ministry of Housing, Spatial Planning and Environment (VROM hereafter) supervises the sector to ensure that its annual emissions do not exceed 28 Mton CO_2 equivalent (VROM, 2005). To stay beneath this target, the industry and other economic sectors have to embrace sustainable energy, energy efficiency and energy conservation, and a range of policy packages are on offer to encourage this. Legally enforceable standards are achieving a great deal in new building projects. This is a relatively simple option to implement, since a building permit is required for every substantial new building. One of the grounds on which the building permit is based is the energy performance standard, which has become increasingly stringent since its introduction in 1995. During this period the energy performance standard has contributed to an increase in innovation and the adoption of new, innovative building materials (Noailly, 2010). Utilisation of these innovative, standardised materials in an environment with no existing infrastructure is becoming increasingly widespread: the standard must be met, after all. The standard has only a limited impact, however, as it covers only a small part of the total Dutch housing stock: only 1% of the dwellings in the Netherlands change hands every year (Bouwend Nederland, 2005). Moreover, buildings last longer nowadays. Viewed from this perspective, the issue is to achieve more with the existing housing stock (VROM, 2005).

High energy conservation levels are possible nowadays, using less radical but efficient technologies, such as innovative insulation materials. In its policy scenarios the Dutch government aims at 50% reduction in energy use in the existing housing stock by 2020 (Ministerie van Wonen, Werken en Integratie et al., 2008; ECN, 2009). Meeting energy efficiency goals in the existing housing stock remains difficult. An evaluation of the 'built environment' sector of climate policy concluded that goal achievement in existing housing was lagging behind achievements in the new housing stock (Ecofys, 2004).

An important factor that hinders the achievement of large-scale energy conservation in the existing housing stock is the absence of regulation. There is no energy performance standard for existing buildings, nor is it a simple matter to draft one. One difficulty, for example, is that it would be inconceivable to deny tenants and owner occupiers their right of residence because they could not afford to make the necessary investments due to their relative poverty.

* Corresponding author. Tel.: +31 53 489 3242; fax: +31 53 489 4850.
E-mail address: t.hoppe@utwente.nl (T. Hoppe).

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For instance, a recently renovated dwelling has to last for some time before new investments are made, or the destruction of capital would be immense. Besides that, there is a cultural and legal element – 'My home is my castle' – which makes it very difficult for the authorities to impose compulsory measures. Although local authorities have legal instruments that enable them to demand that building owners retrofit their property if its physical status is below acceptable standards, these instruments are only seldom used.

In the absence of regulation, public governance can only depend on the voluntary actions of the housing owners. Local government can try to encourage them to adopt energy conservation measures using economic and communication policies, such as subsidy schemes, promotion campaigns, advertisements, and energy auditing. One of these measures involves an energy efficiency monitoring system and looks at the level of ambition set in renovation projects in residential areas. The monitoring followed efforts by local governments to have energy ambitions set for large scale urban renewal projects. Local governments that adopted a co-financed subsidy scheme (BANS) from national government were stimulated to formulate energy ambitions. This was further stimulated by national government, which provided a small subsidy to finance an audit and advisory report to those local governments that were motivated to set ambitions in the field of energy efficiency in urban renewal project areas.

We consider that the level of ambition is important because it is a material expression of the degree to which an intended situation differs from the current situation. This also applies to local climate and energy policy goals, especially the setting of goals for energy efficiency in renovation projects on residential sites. However, the more ambitious the goal the more difficult it will probably be to achieve it, due to the expected costs of the means to achieve the intended goal(s) (Bressers and Kolk, 1993). The higher the intended goal the lower its feasibility. Given the fact that the Netherlands will not easily meet its 2010 Kyoto targets, however, it can be stated that setting high energy efficiency ambitions in the existing housing sector is not an unnecessary luxury, as the country needs ambitious goals to meet international standards.

The question that is central to this paper is: to what degree do local governments influence ambitions to conserve energy in existing housing sites? It is expected that local authority climate policy strategy will explain the variation in levels of ambition. The paper features a quantitative analysis of thirty-three existing residential sites in the Netherlands, based on monitoring reports. The paper ends with recommendations for further research on the implementation of energy conservation policies in existing residential sites.[1]

The paper is structured as follows. Section 2 addresses the practice of setting high energy efficiency ambitions for renovation projects in residential sites. Theoretical relevant insights are explored in Section 3. The insights used here derive from social science theories, in particular public administration and policy studies. The section ends with the design of an analytical framework. The hypotheses underlying the analytical framework are presented in Section 4. Section 5 addresses research design and methodology, in this case a quantitative multivariate analysis. Section 6 presents the main results of the analysis. The concluding Section 7 addresses the implications of the results for policy issues and future research.

2. Setting ambitions for energy efficiency goals in renovation projects in practice

Opportunities for large scale energy conservation can be found in urban renewal projects. Such projects aim at improving the social and physical structure of post-War housing estates. The physical measures involve both redevelopment and the renovation of existing housing. A (climate) policy strategy applied by national government that seeks to link into existing urban renewal projects would offer advantages. Urban renewal sites contain a large number of dwellings, and renovating them will be a major operation in any case, so there will be a low threshold for the house owners to adopt energy conservation measures. Although 35% of the dwellings in the country are publicly owned, the majority of dwellings in neighbourhoods in which urban renewal projects are carried out are owned by housing associations. In the dataset used for our study the average proportion of public housing in the residential sites is 77.5%, varying between a minimum of 49% to a maximum of 100%. Housing associations are former public organisations that still pursue the public goal of providing quality housing for relatively poor tenants. The fact that most dwellings in urban renewal areas are owned by housing associations offers advantages in terms of economies of scale in the adoption of energy conservation measures. Few problems are encountered, for instance, with the distribution of property titles. Furthermore, housing associations are sufficiently well-endowed financially to make large investments.

Since the policy instruments used are mostly communicative, it is essential that central government has an adequate insight into local practice. To that end, central government has reserved an important task for local governments. From 2002 to 2004 central government ran the BANS co-finance subsidy scheme to encourage local authorities to pursue a local climate policy. Nearly half (237) of all local authorities in the country participated in the scheme (KplusV, 2006). To encourage local authorities to pursue local climate policies, they were allowed to select from a so-called 'BANS Menu' a policy instruments configuration that would reflect their own ambition. They could choose among three ambition levels and associated policy instrument configurations. In descending order these were: 'innovative', 'front running' and 'active'. One of the policy instruments on the menu was the *Energy Performance on Location* (EPL), which was used to formulate the ambition to improve energy performance on housing association sites with more than 250 residential units. Such sites are often associated with substantial renovation projects in the urban environment. A lot of decision-making is involved before an energy efficiency ambition is set. Energy ambitions are mainly set for sites that are part of large-scale renovation projects that are already in progress. Therefore, the central aim of such projects is to renovate houses and improve the social structure on site. Energy efficiency is added to the project's target mix. This hardly happens right at the start of a project and has the disadvantage that it only occasionally becomes a renovation project priority. As mentioned earlier, energy efficiency targets for residential sites are put on the agenda by local officials as a consequence of their adopting the integrated BANS local climate policy package, often as part of environmental policy, which falls under the responsibility of the environmental official (an alderman). Consequently, the task is taken over by a civil servant who coordinates matters in the field of local climate policy. This civil servant then has the task of convincing his colleagues who are involved in ongoing local construction and housing renovation projects to take energy efficiency goals into consideration and set high levels of ambition for them. These colleagues are employed by other policy departments within the municipal organisation. It is often difficult to convince these civil servants, especially because the climate policy coordinator does not have many financial incentives to offer. Consequently, it often becomes a tough struggle to put energy efficiency on the agenda and keep it there. If the energy efficiency goal is initially accepted, an audit is required, which reports the current status and a strategy for improvement. An external consultancy or engineering company conducts the

[1] This paper describes research that was funded by NWO, The Netherlands Organisation for Scientific Research under the programme '*Vulnerability, Adaptation, Mitigation*'.

audit and reports on behalf of the local authority and the national government agency for energy affairs, SenterNovem. The report is subsidised by the latter agency.

The report offers several alternative 'energy measure packages' in descending order of energy ambition (from the application of several renewable energy systems to merely changing single window glazing to a high insulating variety). The next step is to formulate the ambition of the energy efficiency level. This is the subject of deliberation between the local authority (officially the alderman) and the owner(s) of the dwellings on a particular residential site. Since most renovation projects involve urban renewal it is housing associations that own most – or all – dwellings, as predominantly public housing is concerned. At this stage tenants are not yet involved in the decision-making process.

Setting high ambitions in the field of energy efficiency ambition is especially tempting for local governments as their environmental official received the credit for it. Other actors, such as the house owners, also receive benefits – such as lower energy bills for the users, increasing value of the dwellings, and corporate branding (for housing associations) – but have to bear the investment costs, which are high and not substantially compensated by subsidy schemes. Moreover, setting high energy efficiency ambitions is especially in the interest of local authorities, because they can benefit if high ambitions are set, while they do not have to bear the burden of the investments (which the house owners do).

After ambitions have been set – following the advice from an audit report which offers several alternative 'energy measure packages' – they are laid down in policy and formal project documents, such as a renovation project master plan. Local authorities report the current status and the ambition set on a particular residential site to SenterNovem, which in turn monitors and archives local ambitions in projects throughout the country.

3. Theoretical literature review and analytical framework

This section examines the theoretical concepts that are of use in helping to answer the central research question. First, we discuss a literature review of factors that influence a local authority's energy and environmental policy effectiveness. Second, attention is paid to policy instruments in the context of Dutch energy efficiency operations in urban residential sites. Third, relevant theoretical insights are addressed. This section concludes by designing an analytical framework that helps to analyse the influence of local governments on setting ambitious energy efficiency levels goals for renovation projects on residential sites.

3.1. Literature review

Virtually every city in Europe acknowledges the importance of energy and local environmental policy. Although energy management of its own capital stock is common practice and can be interpreted as the lower threshold level to local energy policy (Nijkamp and Perrels, 1994), it is interesting to wonder about the degree to which municipalities care for energy efficiency outside their own stock; i.e. the housing stock in the residential areas where its populace lives. This question touches the issue of local environmental policy, which embraces a range of environmental fields. It can be dated back to 1992 when the so-called 'Local Agenda 21' was drafted during the United Nations Earth Summit held in Rio Jañeiro, Brazil. Agenda 21 explained that local authorities have a significant part to play in achieving sustainability goals for the 21st century. One of the local authority's tasks formulated in the agenda is to cut greenhouse gas emissions at the local level (UNCED, 1992). This is an aspect of 'Think global, act local', which was basically nothing new in the Netherlands in 1992.

It is an obvious move to connect the theories that underlie the answers to the central research question in this article to the literature concerning the success factors of an integrated local environmental policy, more specifically the literature on 'Local Agenda 21'. It appears that local environmental policy is more successful the more it fulfils a number of preconditions. The international literature provides insights about preconditions that predict successful local environmental policy from local governments (Barrutia et al., 2007; Coenen et al., 1999; Evans et al., 2005; Kern et al., 2004; Nijkamp and Perrels, 1994). A number of factors are involved, such as a complex knowledge mix, employment of a full-time expert, the presence of motivated and knowledgeable, experienced people at key positions in the municipal organisation, adequate institutional backing of environmental policy targets in the entire municipal organisation, a sustainable management style, the presence of political parties that favour ambitious environmental policies, and a manager or official who monitors the policy agenda. Furthermore, support from higher levels of government is of particular importance. This is not surprising, as many subsidies provide local governments with financial means to carry out their tasks for which little budgetary provision is allocated otherwise. The presence of a supporting network outside the municipal organisation also has an encouraging effect. Besides the expected influence exerted by external parties, such as politicians, financiers, NGOs, and market parties, it is expected that a local authority can itself create favourable conditions—at least in so far as it has sufficient decentralised decision-making authority, which differs from country to country. Finally, it is also important that sectoral policy barriers are identified as a factor that lowers the effectiveness of environmental policy measures. The degree to which environmental policies can be integrated in the entire policy mix could also help to increase local environmental policy effectiveness (Knudsen, 2009). Although many enabling conditions have been addressed, it should not be forgotten that local authorities of large municipalities do not dare to risk any decline in urban growth as a consequence of measures aimed at improving local energy efficiency or environmental hygiene (Nijkamp and Perrels, 1994).

We can add policy instruments to the above preconditions. Policy instruments are used by local governments to influence the behaviour of local target groups. This is important because urban energy and environmental policy depend heavily on external incentives in the form of regulations, conditions for public participation in public support programmes, monitoring systems, and planning and performance indicators (Nijkamp and Perrels, 1994). Evidence from the Netherlands shows that the organisational size of local authorities positively correlates with the number of policy instruments and the available administrative capacity in both local climate policy and local environmental policy (Coenen and Hoppe, 2010).

The issue of policy instruments, however, must be viewed with considerable reserve in the policy domain of energy conservation in existing residential areas. Due to the absence of legal instruments, governments need to rely on communicative and economic instruments to convince house owners and other actors who have a stake in improving the existing housing stock's energy efficiency. Moreover, only 'soft instruments', such as information campaigns, covenants and subsidy schemes are used, which means that governments are dependent on the willingness of their target groups.

3.2. Policy instruments in the Dutch context

In the Netherlands national government supports local governments in the design and implementation of local climate policy via 'BANS', an intergovernmental, co-financing subsidy scheme. Besides

to a cash lump sum, this affords local governments access to information, advice and support from account managers of the energy agency SenterNovem, and information and access to new grant schemes when they are started. Another service provided by SenterNovem is that it fully covers the expense of local residential site audits, which enables local governments to formulate ambitions for improving the energy efficiency levels of the dwellings on site. In line with the theoretical insights derived from the 'Local Agenda 21' literature, these measures give local authorities advantages compared to local governments that do not participate in the BANS scheme.

Another instrument that local governments may use to achieve energy efficiency targets on residential sites relates to the sustainable construction covenant. This covenant has been active since 1997; one aspect that it covers is the public housing sector, a common type of housing in dense urban residential sites, which is also the most common context in this study. Although it was launched with high expectations, an exploratory study concluded that the instrument's effectiveness and the number of local governments participating in it fell below expectations (Van der Waals et al., 2003). Finally, integrated urban renewal policy (ISV) also gives local governments the opportunity to prioritise energy efficiency ambitions in residential sites in which urban renewal projects are already being undertaken. An intergovernmental subsidy scheme provides local government with additional budget for an urban renewal project if it meets environmental performance indicator requirements. Although energy performance was named as a goal of the ISV-1 policy (2000–2004), it has nearly always been considered a 'non-priority'. When the policy was evaluated, it was stated that it is difficult for the local authority to influence an indicator like energy conservation. It was also stated that a relatively large number of 'sustainable construction' projects did not come to fruition, compared with projects run under other themes or in other performance areas (Ecorys, 2006).

3.3. Theoretical relevance

The conditions we consider influential on the setting of ambitions for energy conservation goals on residential sites can be classified in two theoretical clusters: (1) local government organisational factors, which can be further subdivided into motivational factors and resources; and (2) inter-organisational factors, which relate to the ties with and support from other local actors, such as housing associations that own and manage large numbers of dwellings. The exchange of resources is crucial in this regard, both in terms of knowledge and financial assets.

3.3.1. Organisational factors

The argument that the organisational characteristics of local governments contribute to the achievement of environmental policy goals in the local context, such as energy efficiency in residential sites, is based on the literature on the effectiveness of public service provision and public management (Taylor, 1912; Gullick and Urwick, 1937; Steers, 1975; Lynn, 2007). In particular, those models that aim at explaining the degree of policy effectiveness through the devotion and commitment of autonomous public (and semi-public) organisations are of special importance. These models can be subdivided into several elements. Boyne (2003) performed a meta-analysis and found systematic evidence of a positive influence from organisational resources (such as budget, personnel capacity, and knowledge), as well as management style (such as leadership, organisational culture, and planning).

Given the empirical pattern of organisational influence on public service provision, it is useful to create a sub-division into two clusters that concern local government's organisational characteristics which are expected to exter a positive influence on the pursuit of energy efficiency targets on residential sites. According to the Contextual Interaction Theory, which is designed to analyse environmental policy implementation processes (Bressers, 2004; 2009), a division can be made into the actors' motivational and resource/power characteristics; local authorities in this case.

The first condition involves motivational factors that enable local governments to design environmental policy strategies to include energy efficiency targets in the housing sector, and to implement these strategies. Moreover, these factors relate to officials' preferences, formalised in policy documents. By doing this, local governments show the degree to which they attribute importance to environmental policy (goals). The second factor to be distinguished among the organisational factors of local governments concerns the use of resources and the ability to exercise power. These resources and policy instruments more generally, enable local governments to fulfil their policy ambitions. Furthermore, the use of the resources to meet policy goals depends on the commitment of local governments.

3.3.2. Inter-organisational factors

Organisational factors are not the only factors that may influence policy effectiveness in the field of local sustainability. Local governments also depend on collaboration and exchange of resources with many other actors. In contrast to the (intra-) organisational paradigm, the analytical emphasis lies not on bilateral relations between the local government and a single, homogeneous target group but with a multitude of actors, all of which have interests. In the case of policies to encourage high energy efficiency levels in dwellings on residential sites, many non-public actors have a stake, such as housing associations, tenants, owner-occupiers, project developers, advisors, institutional investors, and contractors. The literature that covers the involvement of multiple actors falls under the heading of 'policy networks' (Marsh and Rhodes, 1992; Bressers, 1993; Dowding, 1995; Smith, 1997; Börzel, 1998; Bressers and O'Toole, 1998) and its normative equivalent 'network management' (De Bruijn and Ten Heuvelhof, 1991; Klijn, 1996; Kickert et al., 1997). The latter's main analytical focus concerns the hypothesis that management of collaborative ties between mutually dependent actors that exchange resources improves public service provision outcomes. Furthermore, the probability that policy goals will be met effectively will be positively influenced if the multitude of actors involved share normative opinions and have a high frequency of interaction (Bressers and O'Toole, 1998). Although only a few of the hypotheses underlying the policy network literature have been explored systematically, some empirical evidence verifying the main theses has been presented. In the field of policy studies (especially the implementation variant), partial explanations of policy effectiveness have been put forward (De Bruijn and Lulofs, 1996; Meier and O'Toole, 2003). In this regard, Barrutia et al. (2007) might be on the right track as they formulated the proposition that local support networks increase the likelihood that local environmental policy will become more effective.

3.4. Analytical framework

This subsection summarises the main theoretical claims made in the foregoing sections. The claims are used to derive at an analytical framework, which involves a simplified research model with three independent variables: local government motivational factors, local government resource factors, and local actor network factors. The dependent variable is the degree of ambition set in a renovation project on a residential site. The analytical framework is

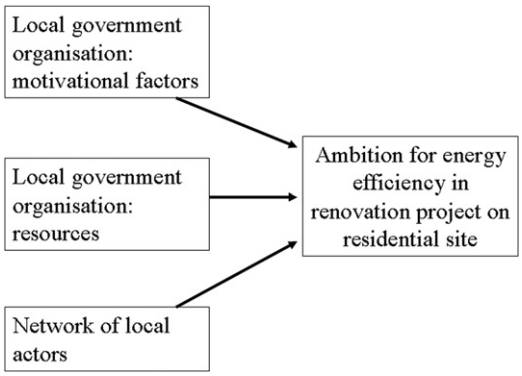

Fig. 1. Graphical presentation of the analytical framework.

presented in Fig. 1. The hypotheses that are part of the framework are addressed in the following section.

4. Hypotheses

The central question examined in this paper concerns the degree of influence exercised by local authorities on ambition-setting of energy efficiency in existing housing sites. Three clusters of independent variables are identified: (1) the cluster 'influence by local governments: motivation', (2) 'influence by local governments: resources', and (3) the cluster 'local actor network'. All of the three factors are hypothesized to influence the ambition-setting of energy efficiency in renovation projects on residential sites positively. Because the variables will cover a set of items they will be addressed as 'variable clusters' from now on. All items underlying the clusters will be hypothesized separately. This also applies to the expected direction of the correlation with the dependent variable. Furthermore, six context variables are introduced as they will be controlled for in the analysis. In Table 1 an overview is presented of the hypotheses that will be tested in this study.

4.1. Clarification of the hypotheses from the cluster 'influence by local governments: motivation'

The *political orientation of the local ruling coalition* is important because it is assumed that the further left-leaning the ruling political coalition is, the greater the weight that will be attached to ecological sustainability in the political decision making process. The direction of the correlation for this hypothesis is given as negative in Table 1 because the scale runs from 'left' (low) to 'right' (high).

The pursuit of a *local climate policy* is important because it allows closer ties to be forged between political goals, intermediate goals and the available means. Energy efficiency improvement in existing housing projects forms part of this.

4.2. Clarification of the hypotheses from the cluster 'influence by local governments: resources'

District size: This has a positive effect on improvements in energy performance in the existing housing stock because large local authorities have a large civil service. The assumption here is that large districts pay more attention to and have a greater budget available for formulating and achieving energy/climate targets than their smaller brethren.

The *size of the BANS budget* is important because co-financing from central government helps the local governments to create institutional capacity for the better, more efficient implementation of climate policy. This facilitates the achievement of the appropriate goals.

Table 1
Overview of hypotheses and expected directions of the correlation coefficients.

Variable	Direction of the expected correlation
Cluster 'influence by local governments; element motivation'	
Political orientation of the local ruling board	−
Degree in which climate policy is being implemented	+
Cluster 'influence by local governments element resources'	
Size of the municipality	+
Size of accredited BANS-budget	+
Size of accredited urban renewal budget	+
Cluster 'local networks'	
Participation in covenant on sustainable construction	+
Efforts by the local government to collaborate with other local actors	+
'Control variables concerning the project context'	
Address density on site	+
Expected amount of refurbished dwellings after the realisation of the project	+
Expected share of new-built dwellings after the realisation of the project	−
Share of dwellings to be demolished on site	−
Average value of dwellings on site	+
Energy performance of the existing housing stock at the beginning of the project	−

The *size of the urban renewal budget* (ISV) is important because it increases the options available to local government for more active negotiation with the housing associations and other property owners within the configuration of housing projects. The local authority is taken more seriously within the housing project configuration if it is able to co-invest to improve the physical quality of a given urban site. Climate goals can be integrated into this area.

4.3. Clarification of the hypotheses from the cluster 'local actor networks'

Local authority efforts to collaborate with local actors are made by the local authority to get local actors actively involved in the joint realisation of climate goals in the built environment. The more efforts the local authority makes to collaborate with local actors, the higher the formulated ambition for improvements in energy performance will be.

Secondly, the presence of a *Sustainable Building Covenant* encourages the level at which ambitions are formulated. The covenant encourages collaboration between the parties involved at a given site. Moreover, the improvement of energy performance is one of the goals set down in the covenant.

4.4. Clarification of the background factors

The datasets we used allowed for six background factors. They are stable factors, that can hardly be changed over time and appear influential for local actors to set high ambitions for energy efficiency in residential sites.

The *address density* on site plays a role in terms of perceived advantages of scale. Economies of scale are easier to achieve at a location with a high address density than a low one.

The *expected amount of refurbished dwellings after the realisation of the project* is important because the larger the number of dwellings to be renovated, the greater the likelihood of economies of scale. This decreases the marginal costs per dwelling unit when implementing energy conservation measures.

The *share of buildings to be demolished* in an existing housing project is important because demolition is very expensive. The costs could have been invested in renovating the existing dwellings. Demolition is an indirect pointer to the reduced importance of renovation within the project. It therefore has an adverse influence on the level of ambition.

The *share of newly built dwellings* in a project is important because new construction by the property owner has a greater financial priority than the maintenance of existing dwellings. The reason for this is that renovation is often perceived as an 'unprofitable' investment, while new construction implies a profitable, long-term investment.

The *average value of a dwelling* on the site is important because it is assumed that more will be invested to maintain higher-value dwellings than their lower-value counterparts. In this context, energy performance improvement can be assumed to be part of the housing quality. Improved energy performance can therefore be expressed in the value of the dwelling. It is supposed that the owner of low-value housing would rather tend to invest less, or have the dwelling demolished. The costs of renovation or maintenance make up a relatively greater share of dwelling's total value.

Finally, it is hypothesized that the lower the *energy performance of the existing housing stock at the beginning of the project*, the higher the level of ambition to improve its energy performance. The reason for this is that it is cheaper to improve dwelling units with a low energy index than dwellings that already have a high energy index value at the start of the project. In the latter case, only innovative, expensive measures can increase a dwelling's energy quality any further.

5. Research methodology

The dependent variable in the study is the ambition for the intended energy conservation on site. Ambitions can be interpreted as an important first step towards realisation of energy conservation in existing residential sites. The units of observation in the study are existing residential sites that feature urban renewal projects.

5.1. Sample

The research domain is the Netherlands. By selecting a set of residential sites from existing datasets we have tried to select a representative sample of large scale renovation projects on existing residential areas in the Netherlands. To derive at a dataset that contains both information on energy performance indicators and ambitions, and physical and societal neighbourhood indicators several datasets were explored. After the exploratory stage information from several datasets were merged in one central database. This concerns information on municipalities and districts (*Gemeente op Maat*; CBS, 2005), energy performance and ambitions (*EPL Monitor*; CE, 2003; W/E adviseurs 2005, 2007), local sustainable governance indicators (*Lokale Duurzaamheidsmeter*; COS, 2003, 2005), expenditure of urban renewal subsidies per local government (*ISV*; VROM, 2005a), and expenditure of local climate policy subsidies per local government (*BANS*, SenterNovem, 2006). The dataset contains thirty-three urban renewal projects on residential sites. This number follows from a close inspection of 66 projects that were initially present in the dataset. Next, descriptive statistics were studied on both energy and contextual indicators. Sites on average featured 961 dwellings at the beginning of the project and 715 dwellings when the project was to be realized. More descriptive statistics concerning the sites can be found in Table 2.

Table 2
Descriptive statistics on key indicators of the sites monitored.

Key indicator	Statistical mean	Standard deviation
Inhabitants per municipality	98,227	65,510
No. of dwelling before take-off of project	961	855
No. of expected dwellings at the end of project	715	737
EPL pre-measurement	3.58	1.05
EPL post- measurement (ambition)	5.73	0.54
EPL difference (ambition improvement)	2.15	1.06
Address density	2,060	780

Because of the size (in number of dwellings) projects in were removed from the list. For instance, a project in the Western part of the Dutch capital Amsterdam was removed from our list as the initial number of dwellings accounted for 54.000 units from which 40.700 were to planned to be realised (either refurbished or newly built) at the end of the project. The amount of dwellings is more than 50 times the size of an average project site in our dataset. Furthermore, there was a problem with doublings in the count of projects. Some projects even had three counts. In the end only data concerning thirty-three sites remained useful for analysis as thirty-three other projects were released from the initial list.

5.2. Representativeness

The representativeness of the sample was investigated. This is important because we wanted to know to which degree the sample mirrors existing residential sites throughout the Netherlands in which renovation projects are going on. Besides analysing descriptive statistics and information on the geographical spread across the Netherlands experts were interviewed including the responsible civil servants at the agency that implemented the monitor on energy performance indicators (SenterNovem) and interviewees from the research institute that carried out the monitoring duties. The interviews also showed that the process of data collection on ongoing urban renewal projects on the particular topic of energy performance meets difficulties. For instance, civil servants of local governments who possessed specific knowledge about energy efficiency goals on monitored sites, had changed their jobs or were not able to gain sufficient access to recent information on key indicators of the local urban renewal projects. Problems like this led to lowering the number of urban renewal projects monitored in the Netherlands. Interviews were also held with the commissioner and the contractor of the EPL Monitor 2006 report, as well as the contractor for the Local Sustainability Meter reports (the 2003 and 2004/5 editions). These talks, coupled with an examination of the quantitative datasets, revealed differences between local municipalities within which the monitored projects are located and the rest. It turns out that the municipalities that contain the monitored projects (our units of observation) have a relatively higher address density and a higher percentage of local authorities that participate in the intergovernmental climate policy scheme BANS. Differences were also found for the items 'structural budget for climate policy', the 'presence of a climate coordinator within the municipal organisation', and the percentage of local authorities in which solar energy systems have been installed. These are indications of self-selection bias. The more climate policy measures a local government implements the more likely it becomes that it also formulates energy efficiency goals for its residential sites. The project sites in the sample used in our study only mirror renovation projects on residential sites in districts with high address density and a local authority that implements an above-average local climate policy strategy. Table 3 presents an overview of the items on which local authorities in which the selected cases (our sample of 33 units of observation) can be compared to the group of 432 local

Table 3
Comparison between municipalities containing selected sites and other municipalities (percentage 'yes').

Item	Selected group (sample) (%)	Total group (%)
Structural budget for local climate policy?	77	59
Did the municipality participate in the BANS scheme?	80	51
Is there an active and structural collaboration with local actor in the implementation of local climate policy?	77	40
Is a climate coordinator exempted from other tasks?	73	48
Has one solar thermal heating system been applied per 100 households?	40	12
Has one solar PV system been installed per 50–100 households?	40	15

Table 4
Results of the analysis with bivariate correlations; significant correlation coefficients are flagged (1 asterisk means significant on 95%-level; 2 asterisks mean significant on 99%-level).

Variable	r	p	n
Cluster 'influence by local governments element motivation'			
Political orientation of the local ruling board	−.132	.244	30
Degree in which climate policy is being implemented	.397	.022*	26
Cluster 'influence by local governments; element resources'			
Size of the municipality	.187	.162	30
Size of accredited BANS-budget	.209	.134	30
Size of accredited urban renewal budget	.185	.177	27
Cluster 'local networks'			
Participation in covenant on sustainable construction	.175	.191	27
Efforts by the local government to collaborate with other local actors	.513	.003**	27
'Control variables concerning the project context'			
Address density on site	.065	.367	30
Expected amount of refurbished dwellings after the realisation of the project	.191	.155	30
Expected share of new-built dwellings after the realisation of the project.	−.436	.008**	30
Share of dwellings to be demolished on site	−.115	.273	30
Average value of dwellings on site	−.123	.259	30
Energy performance of the existing housing stock at the beginning of the project	−.854	.000**	30

authorities that participated in the local sustainability monitor 2004/5 edition (on a total of 467 local authorities in the Netherlands).

5.3. Data analysis approach

The hypotheses were tested by doing a multivariate regression analysis. Previous to the regression analysis bivariate correlations were checked and reported. Due to the theoretical knowledge about the hypotheses the expected correlation directions were known. Therefore, one-tailed tests were conducted. Only variables significant at $p < .10$ entered the regression model. Due to the low number of observation units ($N=33$) a confidence level of 90% was used and the 'forward'-method of regression analysis applied. In Appendix 1 information is provided concerning the operationalization of the items used in our research model.

6. Results of the analysis

The empirical analysis comprised two phases. First, an analysis with bivariate correlations was conducted to get an indication of the correlations between independent and dependent variables. Second, a multivariate regression analysis was done to check the relative influence of variables in comparison to each other. The dependent variable shows a nearly perfect standard normal distribution (skewness=.004).

6.1. Bivariate correlations

In Table 4 an overview is presented concerning the results of the analysis on bivariate correlations. In the table r indicates the correlation coefficient, p the random chance, and n the number of units of observation (renovation projects on residential sites) in the analysis.

Two of the items correlated significant to the dependent variable. The variable 'degree in which climate policy is being implemented'—part of the cluster 'influence of the local government: motivation' turned out to correlate significant ($r=.397$; $n=26$; $p=.022$). The second variable that correlated significantly concerns 'efforts by the local government to actively collaborate with other local actors' ($r=.513$; $n=27$; $p=.003$). The variable is part of the cluster 'influence of the local government: resources'. The other items did not correlate significant to the dependent. For most of those items this was quite striking as they were clearly designed to help stimulating energy efficiency, such as the BANS-subsidy scheme and the covenant on sustainable construction, and to a lesser degree the urban renewal subsidy ISV (which did contain the performance indicator energy efficiency). Size of the municipality, indicating local government organisational capacity also did not correlate significantly to degree of energy conservation ambitions in renovation projects on residential sites.

As it turns out two control factors correlated significantly with the dependent variable. They concern 'the expected share of new-built dwellings after the realisation of the project' ($r=-.436$; $n=30$; $p=.008$) and the 'energy performance of the existing housing stock at the beginning of the project' ($r=-.854$; $n=30$; $p=.000$). The latter concerns a very strong correlation in size. Both correlations have negative directions. However, the sign of the direction was predicted.

6.2. Multivariate regression analysis

All four significant variables from the analysis with bivariate correlations were included entered in the multivariate regression

Table 5
Results of the multivariate analysis on ambition-setting concerning energy efficiency on existing residential sites; the confidence interval is 90%.

Variable	β	Significance	Degrees of freedom	F	R^2	Adj. R^2	Contribution to R^2
Energy performance of the existing housing stock at the beginning of the project	−.832	.000					.816
Efforts by the local government to collaborate with other local actors	.182	.053	24	64.730	.844	.831	.028

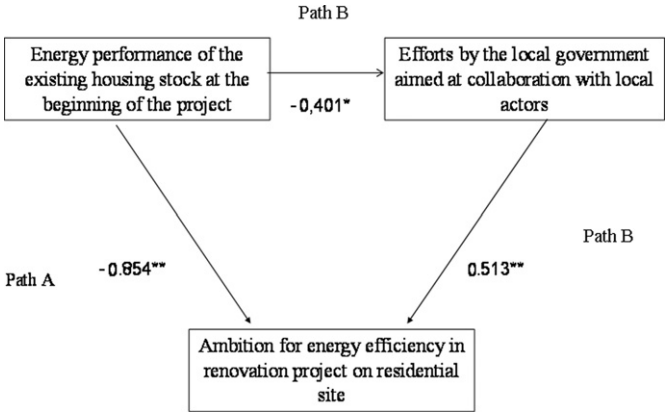

Fig. 2. Trivariate research model results.

model. They concerned the variables 'local climate policy', 'efforts by the local government to actively collaborate with other local actors', 'the expected amount of newly built dwellings in residential sites', and 'the expected amount of newly built dwellings in residential sites'. The result of the multivariate analysis presented two significant variables: 'the expected amount of newly built dwellings in residential sites' ($\beta=-.832$; d.f.=24; $p=.000$) and 'efforts by the local government to actively collaborate with other local actors' ($\beta=.182$; d.f.=23; $p=.053$). A multivariate model featuring the two variables helped to explain 84.4% of the variance. An univariate model only consisting of the most significant independent variable explained 81.6% of the variance. In Table 5 the main results of the multivariate regression analysis are presented.

There is, however, also a correlation between these two independent variables ($\beta=-.402$; d.f.=26; $p=.034$). Since this correlation exists, it is interesting to look at the indirect effect and the total effect of the variable 'local authority efforts to involve other actors in the implementation of local climate policy' on the dependent variable. This effect of the energy performance on the local government effort degree indirectly influenced the ambition level of energy performance of renovation project on residential sites. In this way the energy performance quality of the dwellings on site had both a direct negative effect (via path A in Fig. 2) and an indirect negative effect via efforts by the local government to collaborate with other local actors (via path B in Fig. 2). The direct effect was clearly stronger than the indirect effect. Fig. 2 presents a trivariate model; this including the paths of influence between the independent variables and the independent variable. In the presentation the strength (correlation coefficients) and direction of the paths are mentioned.

One interpretation of this result is that local authorities formulate lofty ambitions first and foremost for projects where the initial energy values of the dwellings involved are relatively low. Better energy values of dwellings in existing housing projects lead the local authority to formulate lower levels of ambition for energy performance. The effect of local authority efforts to collaborate with local actors seems to be much weaker, but there was also an indirect effect, which revealed that the two direct explanations for the level of ambition cannot simply be viewed independently of each other. The more collaboration efforts a local authority made, the greater the probability the sites were chosen with a low (initial) energy value, which meant that a higher level of ambition could be formulated.

This finding merits further explanation. As explained earlier in Section 2, dwellings with a relatively poor energy reference value can be improved at relatively low cost. The level of energy performance formulated can serve as an indicator here. The fact that only a small variation is found for this indicator ($\mu=5.72$, range=3.02, $\sigma=.54$) implies that, politically speaking, local authorities were content to achieve only a 'pass' for their energy performance in existing housing projects. A further clue is that seven existing housing projects achieve a score of exactly 5.5, with a further seven projects scoring a 6 (from a total of 31 projects for which a level of ambition has been formulated). A score greater than 6 was formulated in only four cases. In three of the four cases, this related to the construction of a district heating network. This heating scheme was to replace the conventional supply, which in turn meant, according to the EPL scoring scheme, that the energy performance would be considerably improved. The EPL method concentrated strongly on the consumption of primary energy (natural gas) at a given site. A district heating network would replace the natural gas consumed in the home with remanent heat, leading to a steep drop in the consumption of natural gas on the site.

The analysis leads one to suspect the local authorities of using insider knowledge when selecting the housing projects. This becomes more understandable if one considers that the local authorities seek to achieve a minimally acceptable political goal (a mere 'pass' on the EPL scale: a 5.5 or a 6). This achievement of a minimum target can be better understood if one also considers that considerable weight is commonly attached to the financial feasibility of a renovation project. It seems that few local authorities were seeking a place at the top of the class; indeed, many of them got involved only with gritted teeth. In addition, they all wanted to sit in the front row for a dime, although further findings of this research cast doubt on that 'front row' feeling. In any case, it was precisely those local authorities that actively engage in networking which also formulate higher levels of ambition by going in search of the low-hanging fruit. Collaboration with other parties could help them gain a good view of the problem.

7. Conclusions

A quantitative multivariate analysis has been performed to analyse the influence of local governments on the ambition to improve the energy efficiency level of existing housing on existing residential sites. In addition, the influence of two clusters of independent variables has been investigated. We looked at two different types of local authority characteristics: motivational factors and resources. Secondly, we looked at local actor networks. We also controlled for project-context background factors. The study used 33 existing housing projects as units of observation.

The outcome of the analysis was that the most significant explanation for a high level of ambition is a relatively poor 'energy quality of the housing stock at the start of the project', a contextual

factor. This was followed by the factor 'local authority efforts to collaborate with local actors'. It turned out that these two directly explanatory, independent variables were correlated. This exposed an indirect effect: the more a local authority engaged in networking, the lower the quality of the sites selected, which in turn led to higher levels of ambition being formulated. Thanks to their efforts at collaboration, the local authorities came into contact with local actors, which gave them an insight into locations where a high level of ambition could be formulated. These were principally sites with an initially poor energy quality. These sites allowed politically acceptable ambitions to be formulated (a 'pass' grade), given the local climate policy goals. This was mainly a strategy of plucking the low-hanging fruit first, rather than achieving any high level of ambition. It should also be noted that the existing housing projects for which high levels of ambition were formulated were most often located in districts where the local authority had a relatively well-developed climate policy, a relatively large amount of multilevel intergovernmental subsidy from central government under the BANS programme, high address density and a relatively large number of residents. Moreover, there was a slight selection bias towards sites in dense urban areas, located in municipalities where the local authorities had above-average climate policies.

The study provides starting points for systematic empirical research on the realisation of energy conservation in existing housing, especially in large-scale refurbishment projects. It is clear that an ambition is important to achieve an energy conservation goal, but further investigation is necessary to discover how important it really is. In-depth case studies and studies with comparative research designs could help to further such insights.

Appendix 1. Operationalization

In this appendix the operationalization of the items underlying the variables from the analytical framework is addressed. First the operationalization of the dependent variable will be mentioned. Henceforth, the operationalization of the items underlying the independent variables will be addressed. This also applies to the background factors.

Operationalization of the dependent variable

Energy efficiency ambition is operationalized as the degree to which energy performance increases from the initial situation (prior to the renovation measures being applied) to the projected situation after the renovation project has been realized. Data were used from the EPL monitor editions. The scale being used for the EPL indicator is interpreted by readers as a ten-point scale. The higher the score the better the energy performance of a given location. An ambition with the score '10' indicates that on net basis no more GHG's are emitted to the atmosphere. Energy performance figures were computed for the renovated areas in residential sites both before and after restructuring. These values are expressed as marks (as for term papers), whereby the EPL value prior to restructuring is deducted from the situation post restructuring. The term 'restructuring' is perhaps unfortunate: 'renovation' would have been clearer. An example may clarify matters: *The Europarei site in the town of Uithoorn has an EPL of 1.7 prior to renovation. The ambition is to achieve an EPL of 6.0 post-renovation (SenterNovem, 2007: 9). The (envisioned) improvement in energy performance is thus 6.0–1.7=4.3.*

Operationalization of the independent variables

The operationalization of the items underlying the variables will be presented per cluster of variables in the analytical framework.

Cluster 'influence by local government: motivation'

The item 'political orientation of the ruling board' concerns the composition of the municipality ruling board. They concern the political background of the officials who have seats in the board. Information from separate municipalities was collected to get insights in the composition. Following, the compositions were coded to a five-point scale, where on the one extreme '1' means 'utter left wing' and the other extreme '5' means 'utter right wing'. The scale concerns the political dimension.

The item 'degree in which local climate policy is being implemented' concerns the score local governments have on the item of 'climate' – the addition of policy measure items related to climate policy – in the local sustainability monitor. The scale indicates the amount of policy measures that a local government implements as part of their own climate policy. They may concern items such as the presence of a structural budget for the implementation of the policy measures, but also the presence of a 'climate coordinator', a civil servant coordinating all the tasks related to local climate policy.

Cluster 'influence by local governments: resources'

The item 'size of the municipality' is operationalized as the number of inhabitants who live in a given municipality. This indicates the organisational capacity of the local government. Data from 'Gemeente op Maat' (data per municipality) from the national statistics agency were used.

The item 'size of the BANS subsidy budget awarded' has been operationalized as the size of the intergovernmental subsidy budget (co-finance) awarded from the national government to a given local government. As a consideration the local governments that participate have to formulate and implement local climate policy strategies. We requested a spread sheet with data to the agency SenterNovem, which carried out the BANS scheme. They provided us with the sheet containing the budget awarded per participating local government.

The item 'size of the accredited urban renewal budget' concerns the size of the budget that local governments received from national governments (Ministry of Housing) as they participated in the intergovernmental co-finance subsidy scheme ISV. The schema features a performance field in 'sustainability'. On request the Ministry of Housing made a spread sheet available to us containing information on the awarded budgets per local authority.

Cluster 'local networks'

The item 'participation in the covenant on sustainable construction' has been operationalized to the indicator with the same name in the 'local sustainability monitor'. The variable has two values: participation and non-participation.

The 'collaborative effort' indicator, concerns a scale index composed of five dichotomous items from the Local Sustainability Meter. Cronbach's alpha reliability test was performed to clarify that the scale is consistent. With a value $\alpha=.828$ the scale was determined to be reliable. If any one of the five items is removed, the alpha value falls. One of the assumptions underlying the formulation of a scale index involves inter-subjective testing, which needs some explanation. The relevant items are: (1) a permanent allocation for climate policy with its own place in the local authority's overall budget; (2) consultation with local actors on the conduct of climate policy; (3) the presence of 'climate coordinator' free of duties in other sector-specific policy domains; (4) an installed base of solar boilers; and (5) an installed base of solar panels. The last two items can be viewed as examples of

successful previous collaboration between the local authority and the housing association and/or owner-occupiers. The first and third items, and to a lesser degree the second one, can be interpreted as the conditions under which the local government is able to initiate collaboration with local partners. Incorporating the items in a scale avoids any problems of multicollinearity.

Context control variables

The context control variable 'address density on site' is operationalized to address density (the amount of dwellings per square kilometre) for a given residential area. The data derived from the 'Gemeente op Maat'-reports by the central bureau of statistics. The reports also had data concerning districts in municipalities.

The context control variable 'expected amount of refurbished dwellings at the realisation stage of the renovation project' concerns the total expected amount of dwellings to be renovated on sites as mentioned in the EPL monitor editions.

The context control variable 'expected share of new-built dwelling at the realisation stage of the project' has been operationalized as the expected amount of newly built dwellings on site. The data derive from the EPL monitor editions. The minimum value is '0' and the maximum value is '1'.

The context control variable 'expected share of dwellings to be demolished' concerns the portion of dwellings on site that will be demolished during the project. This concerns the deduction of the total number of dwellings at the start of the project minus the number of dwellings at the realisation stage of the project, as expected. The variable concerns a ratio scale comprising a minimum value of '0' and a maximum value of '1'.

The context control variable 'average value of dwellings on site' has been operationalized as the average value of a dwelling in the neighbourhood in which a site is located. The data derive from the 'Gemeente op Maat'-report by the central bureau of statistics, under the section 'key indicators for districts and neighbourhoods'.

The context control variable 'energy performance of the housing stock at the beginning of the project' has been operationalized as the EPL-score of the dwellings on a given location before the renovation project activities took off. These values were presented in the EPL monitor editions.

References

Barrutia, J.M., Echebarria, C., Aguado, I., 2007. Local Agenda 21 Implementation: Networking vs. Other Forms of Policy Making. paper presented at Joint Congress of the European Regional Science Association (47th Congress) and ASRDLF (Association de Science Régionale de Langue Française, 44th Congress), 29 August–2 September 2007, Paris.

Börzel, T.A., 1998. Organizing Babylon—On the Different Conceptions of Policy Networks. Public Administration, 75, Summer 1998, pp. 253–273.

Bouwend Nederland, 2005. De bouw in cijfers 2000–2004; uitgave van 2005, Gouda, June 2005.

Boyne, G., 2003. Sources of public service improvement: a critical review and research agenda. Journal of Public Administration Research and Theory 13 (3), 367–394.

Bressers, J.Th.A., 1993. Beleidsnetwerken en instrumentkeuze. Beleidswetenschap 4, 309–330.

Bressers, J.Th.A., 2004. Implementing sustainable development: how to know what works, where, when and how. In: Lafferty, W.M. (Ed.), Governance for Sustainable Development: The Challenge of Adapting Form to Function. Edward Elgar Publishing, Cheltenham, pp. 284–318.

Bressers, H., 2009. From public administration to policy networks: contextual interaction analysis. In: Nahrath, S., Varone, F. (Eds.), Rediscovering Public Law and Public Administration in Comparative Policy Analysis: Tribute to Peter Knoepfel.

Bressers, J.Th.A., Klok, P.-J., 1993. De inhoud van het beleid. In: Hoogerwerf, A. (red.) Overheidsbeleid, een inleiding in de beleidswetenschap, fifth ed., Samsom Tjeenk Willink, Alphen aan den Rijn.

Bressers, J.Th.A., O'Toole, L.J., 1998. The selection of policy instruments: a network-based perspective. Journal of Public Policy 18 (3), 213–239.

De Bruijn, J.A., Ten Heuvelhof, E.F., 1991. Netwerkmanagement; Strategieën, Instrumenten en Normen. Lemma, Utrecht.

De Bruijn, T.J.N.M., Lulofs, K.R.D., 1996. Bevordering van milieumanagement in organisaties. Ph.D. Thesis, Universiteit Twente, Enschede, 1996.

CBS, 2005. Gemeente op Maat 2004. Centraal Bureau voor de Statistiek, Voorburg/Heerlen.

CE, 2003. EPL Monitor 2003 Nieuwbouw- en herstructureringlocaties, Delft.

Coenen, F., Eckerberg, K., Lafferty, W.M., 1999. The status of LA21 in Europe: a comparative overview. In: Lafferty, W.M. (Ed.), Implementing LA21 in Europe: new initiatives for sustainable communities, Oslo.

Coenen, F.H.J.M., Hoppe, T., 2010. Globale uitdagingen op lokaal niveau. Bestuurswetenschappen 3, 77–92.

COS, 2003. De grenzeloos duurzame gemeente; Verslag van de Lokale Duurzaamheidsspiegel 2003. COS Nederland, Alkmaar.

COS, 2005. Gemeenten van de toekomst; Verslag van de Lokale Duurzaamheidsmeter 2004/5. COS Nederland, Alkmaar.

Dowding, K., 1995. Model or metaphor? a critical review of the policy network approach. Political Studies XLIII, 136–158.

ECN, 2009. Verkenning Schoon en Zuinig; Effecten op energiebesparing, hernieuwbare energie en uitstoot van broeikasgassen. ECN Beleidsstudies Amsterdam, Petten, No. ECN-E–09-022.

Ecofys, 2004. Evaluatie van het klimaatbeleid in de gebouwde omgeving 1995–2002 report. Ecofys b.v., Utrecht.

Ecorys, 2006. Resultaatsanalyse ISV1. ECORYS Nederland BV, Rotterdam.

Evans, B., Joas, M., Sundback, S., Theobald, K., 2005. Governing Sustainable Cities, London.

Gullick, L., Urwick, L. (Eds.), 1937. Institute of Public Administration, New York.

Kern, K., Koll, C., Schophaus, M., 2004. Local Agenda 21 in Germany; An Inter- and Intranational Comparison. Discussion paper, Wissenschaftszentrum Berlin für Sozialforschung, Berlin.

Kickert, W.J.M., Klijn, E.-H., Koppenjan, J.F.M., 1997. Managing Complex Networks: Strategies for the Public Sector. SAGE publications, London.

Klijn, E.-H., 1996. Regels en sturing in netwerken: de invloed van netwerkregels op de herstructurering van naoorlogse wijken, Ph.D. Thesis. Erasmus University, Rotterdam.

Knudsen, J., 2009. Environmental Policy Integration and Energy. Ph.D. Thesis. University of Twente, Enschede.

KplusV, 2006. 2e Tussenevaluatie BANS-regeling en BANS-uitvoering, opdrachtgever Senternovem, Arnhem.

Lynn Jr., L.E., 2007. Public management. A concise history of the field. In: Ferlie, E., Lynn. Jr., L.E., Pollitt, C. (Eds.), The Oxford Handbook of Public Management. Oxford University Press, Oxford, New York, pp. 27–50.

Marsh, D., Rhodes, R.A.W., 1992. Policy communities and issue networks: beyond typology. In: Marsh, D., Rhodes, R.A.W. (Eds.), Policy Networks in the British Government. Clarendon Press, Gloucestershire.

Meier, K.J., O'Toole Jr., L., 2003. Public management and educational performance. The impact of managerial networking. Public Administration Review 63 (6), 689–699.

Ministerie van Wonen, Wijken en Integratie, Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, Aedes en Vereniging Nederlandse Woonbond, 2008. Convenant Energiebesparing corporatiesector, Ede.

Nijkamp, P., Perrels, A., 1994. Sustainable Cities in Europe. A Comparative Analysis of Urban Energy-Environmental Policies. Earthscan, London.

Noailly, J., 2010. Improving the energy efficiency of buildings. The impact of environmental policy on technological innovation. CPB discussion paper. CPB Netherlands Bureau for Economic Policy Analysis, The Hague.

SenterNovem, 2006. Division of budget BANS subsidy scheme, provided on request by author.

Smith, M.J., 1997. Policy Networks. In: Hill, M. (Ed.), The Policy Process. Prentice Hall, London, pp. 76/86.

Steers, R., 1975. Problems in measurement of organizational effectiveness. Administrative Science Quarterly 20, 546–558.

Taylor, F.W., 1912. Scientific Management. Excerpt from: Testimony before the US House of representatives, Washington.

UNCED, 1992. Report of the United Nations Conference on Environment and Development. Rio de Janeiro. 3–14 June 1992, vol. 1, Resolutions adopted by the Conference. United Nations, New York. Agenda 21.

VROM, Ministerie van, 2005. Evaluatienota Klimaatbeleid 2005; Onderweg naar Kyoto; Een evaluatie van het Nederlandse klimaatbeleid gericht op realisering van de verplichtingen in het Protocol van Kyoto. Ministerie van VROM, The Hague.

VROM, Ministerie van, 2005a. Division of budget subsidy scheme ISV, provided on request by author, Ministerie van VROM, 's Gravenhage.

Van der Waals, J.F.M., Vermeulen, W.J.V., Glasbergen, P., 2003. Carbon dioxide reduction in housing: experiences in urban renewal projects in the Netherlands. Environment and Planning C: Government and Policy 21, 411–427.

W/E adviseurs, 2005. EPL Monitor 2004 herstructureringlocaties. Report, Gouda.

W/E adviseurs, 2007. EPL Monitor 2006 herstructureringlocaties. Report, Utrecht/Tilburg.