Measuring governing capacity for the energy transition of Dutch municipalities[1]

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Abstract

Municipalities play an important role in the Dutch energy transition. However, it is unclear whether they have enough governing capacity to fulfil this role and thus can formulate and implement new policies successfully. The aim of this study is to assess how the performance of local policy on energy transition can be improved by improving governing capacity. To do so, we conducted a survey, operationalised governing capacity, and assessed relationships between governing capacity and policy output. We found that governing capacity, its preconditions and energy transition policy output differ largely between Dutch municipalities. We found no direct relationship between governing capacity and energy transition policy output. However, we established relationships between preconditions of governing capacity and policy output. Around 25% of the variance in policy performance can be explained by population size. If differences in other preconditions, referring to motivation of the administrative staff, participation of citizens and businesses, and inter-municipal cooperation, are also taken into account, 55% to 59% of the total variance can be explained. To accelerate the local energy transition we recommend to improve governing capacity and its preconditions by stimulating the motivation of the local administrative staff, strengthening the cooperation between municipalities and seeking the participation of citizens and businesses.

Keywords

Energy transition; governing capacity; policy performance

1 Introduction and Theory

The Dutch Government is working on substantial CO_2 emission reductions, stimulated by the Paris Agreement (UN, 2015) which brings obligations for the Netherlands. The Dutch Climate Mitigation Act (*Klimaatwet*) obliges the Netherlands to achieve 49% CO_2 emission reduction by 2030 and 95% by 2050, compared to 1990 CO_2 emission levels. To implement climate measures, the Dutch Government and a large number of other parties, including industry, negotiated and established the Dutch National Climate Agreement (Klimaatakkoord, 2019). Achieving the emission reduction targets and those in the climate agreement requires considerable policy effort, not only on a national level, but also on local levels - especially because of the urgency (IPCC, 2014; 2018), ambition and local impact (e.g., Vringer and van den Broek, 2016).

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This implies that Dutch municipalities will be given more tasks and responsibilities in relation to the implementation of climate policy[3]. However, the current position of Dutch municipalities concerning climate policy leaves several unanswered questions. Municipal officials claim there are problems regarding local financial and organisational capacity to achieve national climate targets. But neither the problems nor the expectations have been made explicit. A national mitigation quota of 35 TWh of renewable energy by 2030 was established for all Dutch municipalities (Klimaatakkoord, 2019). This policy target has deliberately not yet been specified and divided into local quantities, to stimulate bottom-up initiatives and prevent a solution 'lock-in' (Klimaatakkoord, 2019). In addition to this lack of clarity, the most relevant question in the public interest is whether Dutch municipalities have sufficient capacity to achieve the local CO_2 emission reduction targets. And could local policy performance be improved by improving this capacity? In this study we try to give a better view on these questions.

The aim of this study is to assess whether the policy performance in the local energy transition can be improved by improving the governing capacity. Therefore, we will look into the present performance of the Dutch municipalities as for their governing capacity related to the energy transition and we investigate the relationship between the governing capacity and related policy output. To do so, we assessed the situation of the Dutch municipalities and we estimated the relationships between the governing capacity and its preconditions of municipalities and their climate policy performance.

Next we introduce the central concepts and theory.

1.1 Governing capacity and the Dutch energy transition

The capacity of local municipalities to formulate and execute effective policies is referred to by Dutch public administration scholars as 'governing capacity' (*bestuurskracht*; Boogers and Schaap, 2007). According to Boogers et al. (2008), governing capacity consists of three components: decision-making, implementation and accountability. The three components identified by Boogers et al. (2008) correspond to governance literature that describes governmental organisations not just as directive actors who formulate and execute policy, but as actors in a network of stakeholders and other governments (e.g., Teisman, 2007).

The *decision capacity* of municipalities reflects the ability to take well-balanced decisions that will be supported by the local community (Van Kan et al., 2014). This includes the ability to incorporate new information and to balance interests, in combination with smoothly running administrative and political elements. According to the Multiple Streams Theory by Kingdon (1995), successful and timely governmental decisions can only be made when the societal actuality and relevance (problem stream), administrative agenda (policy stream) and the political debate (politics stream) are synchronised. If this condition is met, this is called a window of opportunity. However, in most situations, a mismatch between political and societal urgency and the priorities of the policy agenda occurs. This increases the likelihood of postponement and miscommunication between civil servants, politicians and managers.

For the energy transition, a delay of new policies can lead to not meeting climate targets. We used the agenda setting theory within the Multiple Streams Theory (Kingdon, 1995) to describe the basic conditions for a successful, open and transparent interchange of ideas between the political administration and other policy makers. These basic conditions are very similar to the preconditions for the decision capacity of a municipality. So, decision capacity

[3] Municipalities in the Netherlands may vary in spatial size and population. They can comprise a single village, a number of smaller villages or a city with villages that have become part of the agglomeration. A Dutch municipality is the lowest level of representative democracy and is legally responsible for many zoning regulations and cultural, social and health facilities. The highest political order within the Dutch municipalities is the municipal council, consisting of locally elected part-time politicians.

can be interpreted as the capacity of a municipal organisation to organize progress in decision-making by combining the policy agenda with the state and topics of local political debate. To make climate policy and the energy transition a success, a shared sense of urgency is required, in combination with a government that knows how to force decisions in the event of division. A local government with a high decision capacity on the energy transition is able to prioritise the energy transition in their policy.

According to Van Kan et al. (2014), *implementation capacity* is the extent to which a municipality can perform its legally required tasks satisfactorily, in quantitative as well as qualitative terms (Boogers et al., 2008). Boogers et al. (2008) studied the decentralisation processes towards Dutch municipalities. They argued that the decentralisation processes required more than the governing capacities of municipalities could bear, because the number of tasks for municipalities increased too fast. The development of governing capacity within the municipal organisations simply could not adjust to these new roles and responsibilities timely. With regard to the energy transition, the obligations for the Dutch local authorities were fairly limited in the past.

However, these obligations have increased as well. This redivision of tasks is in line with the Dutch subsidiary principle (not to be confused with the subsidiary principle in EU law). The Dutch subsidiary principle is inspired by Catholic theology, and was originally introduced by the Christian Democrats (Eijfferinger & Hinten, 2013). In the 1980s and 1990s, known as the Dutch neoliberal political era, it was regarded as a common, hardly contested political value (Mulder, 2017). This vision demands the national government to hand over tasks to municipalities and provinces, when there is no national priority. The aim of this, is to let the legislative process be as local and near to the citizens as possible. The subsidiary principle has been the core of many reforms in legislation in the neoliberal era, often combined with deregulation or privatisation (Kok, 1990).

A specific consequence of the subsidiary principle is decentralisation. As the municipality is the lowest level of democratic legal authority in the Dutch state, over time Dutch municipalities have gradually become responsible for implementing a series of new laws and policy domains that formerly were ruled by the national government. For example, municipalities have been targeted for implementing a new, Societal Support and Welfare Act 'Wet maatschappelijke ondersteuning' and the law on Youth Care since 2015 (Netherlands Institute for Social Research SCP, 2018). In this respect, a new package of energy transition policy currently creates an extra burden for the municipalities. Examples include the obligation to formulate heat plans on neighbourhood level (Ollongren et al., 2018), and the obligation to formulate Regional Energy Strategies (RES). Additional obligations are expected as a consequence of the Dutch National Climate Agreement (Klimaatakkoord, 2019). On a local level, these obligations require more knowledge, experience, civil service capacity and money, which are main preconditions for the implementation capacity (Boogers et al., 2008; Hoppe et al., 2016). Although the Dutch energy transition policy is not fully decentralised, parallels can be drawn with other policy areas, which are decentralised between 1993 and 2008 as described by Boogers et al. (2008).

Van Kan et al. (2014) define *accountability capacity* as the capacity of a local government to be accountable and transparent about their policy. According to Boogers and Schaap (2007), this accountability must be given to higher levels of government, other stakeholders and citizens. This view is in line with a shift from governing to governance. But also the internal accountability to the administrative organisation is an important part of the accountability capacity, which includes local evaluations and monitors. For the energy transition, accountability is often a bottleneck, as progression on municipal sustainability goals is frequently not tracked or made public (Panteia, 2018). This can undermine the perceived process legitimacy of the energy transition.

Formalising local climate policy targets shows ambition, but a transparent government and public support requires monitoring and a broad accessible communication strategy of the progressions made. Next to that, accountability is required within the administrative organisation. The energy transition, and its urgency, has a high social and economic impact and requires a broad cooperation within the local administration. The staff should be jointly responsible for the energy transition to prevent obstruction and delay. A high level of internal accountability prevents compartmentalisation and creates a safe policy culture for employees ('t Hart, 2014). A safe working environment and policy culture create more space for critical self-evaluation and monitoring. This reduces the chance of personnel feeling to be silenced in discussions with their superiors regarding the quality of the policy output of their organisation.

1.2 Preconditions for governing capacity and its relation with policy performance

For the analysis of the relation between governing capacity and policy output we use so called 'preconditions for governing capacity'. These preconditions are in theory factors which influence the governing capacity. Two approaches for the preconditions for governing capacity are described in the literature, a narrow one and a broader one. The narrow approach assumes that the size of the population is the major precondition of governing capacity. A larger municipality has more budget to afford a larger administrative organisation and hire more advisors, which means that enough specialised staff and other resources are available to provide itself with the knowledge required, experience, etc. This is due to the funding of the Dutch municipalities, which is adjusted to the number of inhabitants and specific demographic characteristics of the local population. The extra financial space granted by the national government for larger municipalities means that policy performances are closely related with this size. In the Netherlands this has been the motivation of a more or less forced merging of smaller municipalities to larger ones. Unfortunately, enlarging the size of a municipality does not always lead to a larger governing capacity. (Korsten; 2004, 2010; Korsten et al., 2007a, 2007b).

The specification of the three components of governing capacity as described by Boogers et al. (2008) is a response to criticism on the narrow approach described above (Boogers and Schaap, 2007; Boogers et al., 2008). A modern government does not perform its tasks independently, but in collaboration with other stakeholders. That is why accountability capacity is a part of governing capacity and governing capacity is more than just the 'business-economics size of a municipality' (Herweijer, 1998).

According to Van Kan et al. (2014) the broad approach includes the network function of an administration and the ability to be accountable, as well as internal as external. Korsten (2010) mentions that the local context and the role of administrators in particular, are decisive in the development of governing capacity. Noordegraaf and Vermeulen (2007) add that the policy style and informal manners on the work floor are important preconditions for developing governing capacity.

2 Method — Measuring governing capacity and policy performance

To assess the situation of the Dutch municipalities on their governing capacity to achieve the required CO_2 emission reduction targets on a local level, we examined their status quo. To estimate the relationships between the governing capacity and its preconditions of municipalities and their climate policy performance we built an operational model.

Despite the large mobilising power of the concept of governing capacity (Korsten, 2004), there is no consensus among the Dutch public administration scientists on how to measure governing capacity itself (Boogers and Schaap, 2007; Korsten et al. 2007a; Noordegraaf and Vermeulen 2007; Ringeling 2007). Existing governing capacity evaluation procedures are

strongly case-restricted, qualitative and almost always based on self-assessment[4] (Korsten, 2004). That is why we also focus on the preconditions for governing capacity in this study, which can be established more objectively than the governing capacity itself.

We chose for the broad approach for the preconditions for governing capacity, see above. In addition to that, the policy performance for climate policy, such as lowering CO_2 emissions, is difficult to assess directly. We chose to measure the policy output (design and effectuation of policies, such as implementing a subsidy or the placement of public charging stations for electric cars) of municipalities instead of the outcome of the policy interventions (e.g. CO_2 emission reduction). This means that the policy output only consists out of specific policy interventions for the domains relevant to energy transition: i.e. the built environment, mobility and renewable energy and does not include effects on the environmental quality as well as the implementation of measurements taken by other authorities than the municipality.

Though there might be other ways to measure policy results — for instance measuring goal-achievement or the previously mentioned policy outcome — we purposely excluded this from our model (see Figure 1). In this way we measure only the effects of municipal activity. When measuring policy achievements in terms of policy outcome, such as local CO_2-emissions or local energy demand, it is likely that possible effects of the local policy cannot be detected. A mix of national and local aspects (like geographical setting and presence of heavy industry or economic cycles) do also influence CO_2 emissions or energy demand (Wentink & Dagevos, 2016).

2.1 Assessing the situation of the municipalities for the energy transition

To assess the current situation of the Dutch municipalities on their governing capacity for the energy transition, we conducted an online survey halfway 2018 amongst all Dutch municipalities[5]. The questionnaire contained 150 questions about the preconditions for governing capacity (e.g. on presence of resources, such as knowledge, budgets and staff capacity, and motivation of staff and board), a self-assessment of the governing capacity and the policy output for the three relevant domains. We sent a personal invitation to fill in the internet survey by email. The invitation is send to all 380 Dutch municipalities. In the end, we achieved a response rate of about 42% (163 responses). It took the respondents on average about 30 minutes to complete the questionnaire. See for an extensive description and survey questions De Vries et al. (2019), in Dutch.

2.2 Estimating relations between governing capacity and policy output – a model

To estimate the relation between the preconditions for governing capacity and the policy outputs, we built an operational model. We assumed a causal relationship: better preconditions for governing capacity lead to a higher governing capacity, which in turn leads to an increased policy output and results in a higher policy performance. A multiple linear regression was used to determine the mutual relationships between the five preconditions for governing capacity, the three components of government capacity and the three for the energy transition relevant domains (see Figure 1).

[4] It is however true that there are more ways to measure policy performance of municipalities. There are databases, such as Klimaatmonitor (Rijkwaterstaat) and Local Sustainability Index (Fairbusiness, 2014), available with data on Dutch municipal performance. But they focus on the policy results, while the underlying capacities are missing. Korsten (2004) refers not to these data, but to the direct and official quantification of governing capacity as a single entity, being formalized in government-intiated procedures.

[5] The questions in the survey were being answered by civil servants commissioned with the local energy transition and related topics. The digital forms could be filled in as a team, but only a single completed survey could be submitted per municipality.

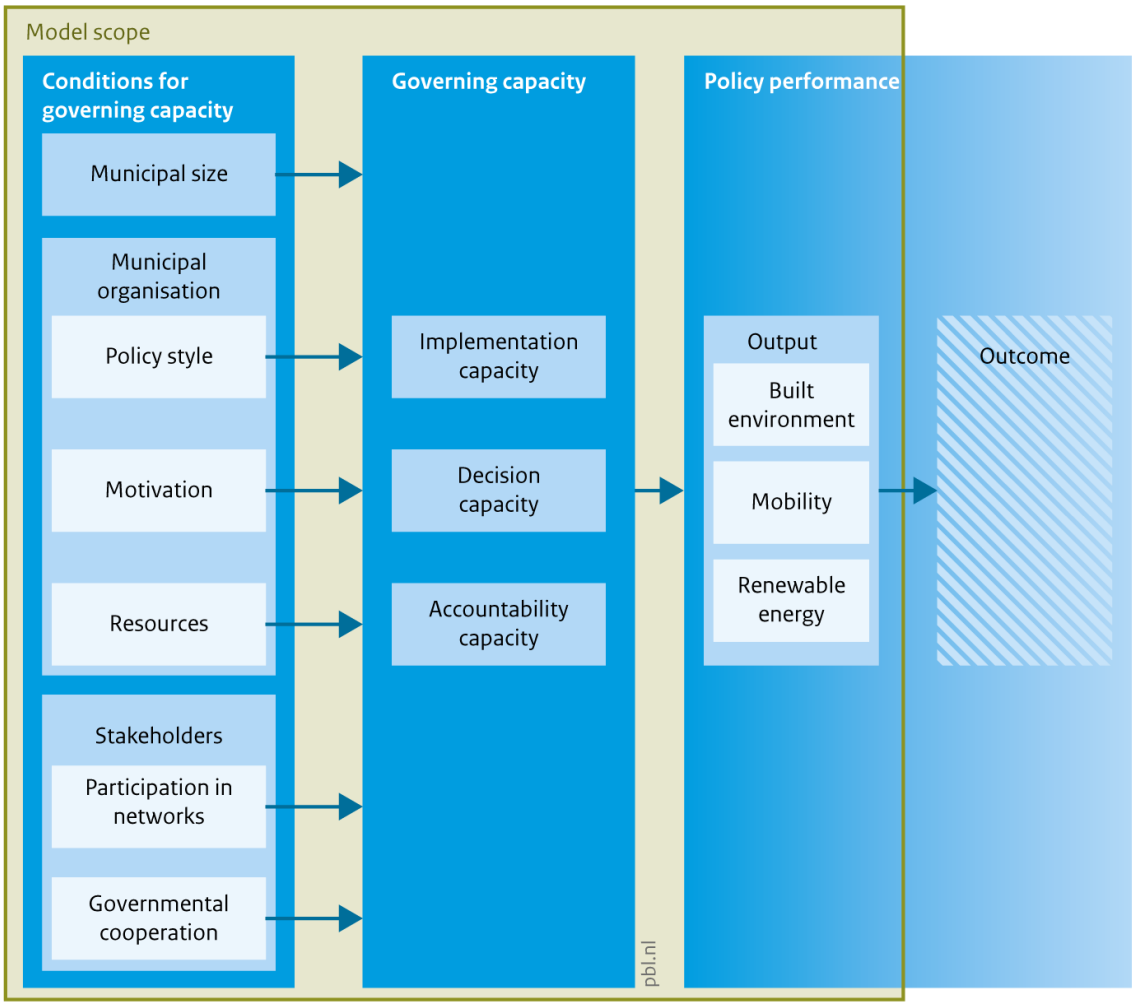

Figure 1. The assumed causal relation between the preconditions for governing capacity, governing capacity, policy output and policy performance.

The variables used to describe the five preconditions for governing capacity are mainly based on Hoppe et al. (2016). We used their schemes containing a framework for analysing local climate policy and action. These schemes contain factors, which influence the municipal administrative organisation as a central actor, sorted as input, throughput and output. The 16 factors of Hoppe et al. (2016) were partly merged, re-categorised and supplemented with other, external elements as policy style mentioned by Noordegraaf and Vermeulen (2007) and perseverance (Partners+Pröpper, 2004). In total we used more than 70 variables to describe the preconditions for governing capacity. For describing the governing capacity, we used 14 variables, divided over the three components according to Boogers et al. (2008). The 14 variables are based on survey questions, formulated by De Vries et al. (2019).

To describe the policy output, we used 192 variables divided over the three for the energy transition relevant domains; the built environment, mobility and renewable energy. An overview of policy options can also be found in OECD (2010). But our variable set exceeds the OECD list for 'The Urban Policy Package', though policy options regarding climate adaptation have been excluded from our analysis.

See Appendix A for an extensive description of all variables.

For the data analysis all variables are standardised. To establish the relation between the preconditions for governing capacity and the policy output we merged the underlying variables per precondition of governing capacity (policy style, motivation, resources, participation and collaboration), precondition of government capacity and policy output without weighting[6].

To fill the model with data we combined data from four complementary[7] databases: 1) the survey as described above, 2). The Telos Governance Monitor (Telos, 2017), 3) the Climate Monitor (Rijkswaterstaat, 2017) and 4) waarstaatjegemeente.nl (Association of Netherlands Municipalities, 2017). The survey was mainly used as a source for data about the preconditions for governing capacity and to measure governing capacity itself. Additionally, it was used for some supplementing data on policy output.

The other databases mostly contain information about the policy output of the municipalities. The Governance Monitor (Telos, 2017) contains a quantification of the 'solidness' and institutionalisation of sustainability and governance principles within official local policy documents, based on intensive text analysis and coding. The Climate Monitor is a general database, combining existing local sustainability statistics compiled by Statistics Netherlands (CBS). Waarstaatjegemeente.nl has the same design and categorisation as the Climate Monitor, but obtained the main portion of its data from own data collection, such as the Energy Enquiry 2.0 by the Association of Netherlands Municipalities (2016).

As the combination of databases ultimately resulted in a selection of 163 municipalities, we checked for several biases, as the selected group of municipalities might not adequately represent the total of 388 Dutch municipalities. We found that the selection of the 163 municipalities does quite good represent all Dutch municipalities. For more information about the datasets, see Appendix B.

2.3 Reliability of the constructed scales

By building the model we made particular choices out of a large number of variables. We tested whether these variables provided reliable scales for the five preconditions, the three components of governing capacity and the three categories of policy output. We determined Cronbach's alpha for all these scales. Cronbach's alpha is a measure for the consistency of the scales. Nearly all values of Cronbach's alpha for all tested scales lie above 0.60. We augmented the Cronbach's alpha of accountability capacity by separating one of its indicators; the variable regularly monitoring, from the other variables in the scale. Thereby we improved the Cronbach's alpha of this scale from 0.66 to 0.82. See Table 1 for all scale values. We conclude that the underlying variables provide reliable scales for the five preconditions, three components and the three categories.

[6] For some conditions the variables first are merged unweighted in one sub-condition (e.g. knowledge). Next these sub-conditions are unweighted merged (e.g. knowledge, experience, etc. into resources.), disregarding the number of underlying variables. The same is valid for the three components of government capacity and the policy output categories. An exact description can be found in De Vries (2019).

[7] The data in the Climate Monitor and www.waarstaatjemeente.nl party overlapped. As the waarstaatjegemeente data on the energy survey were guaranteed to be updated by the Association of the Netherlands Municipalities, we used these data on this matter, which overruled the data from the Climate Monitor.

Table 1. Cronbach's Alpha of constructed scales for categories and indicators used in the model.

Subject	N	Alpha
Preconditions for governing capacity		
Municipal organisation		
- policy style	2	0.2
- resources	19	0.75
- motivation	27	0.73
Stakeholders		
- participation in networks	9	0.62
- cooperation between governmental bodies	15	0.65
Governing capacity		
- implementation capacity	5	0.85
- decision capacity	5	0.75
- accountability capacity	4	0.66**
Policy performance		
Built environment *	*3*	*0.81*
- municipality as partner	13	0.73
- municipality as service provider	32	0.82
- municipality as legislator	38	0.85
Mobility *	*3*	*0.75*
- municipality as partner	8	0.46
- municipality as service provider	22	0.78
- municipality as legislator	17	0.77
Renewable energy *	*3*	*0.73*
- municipality as partner	15	0.61
- municipality as service provider	33	0.77
- municipality as legislator	19	0.79

* The alpha for these categories has been calculated based on the means of the underlying indicators.
** This value includes the sub-indicator 'regular monitoring'. Without 'regularly monitoring', the Cronbach's alpha is 0.82.

2.4 Statistical approach

For the analysis, we chose for multiple regression models to determine the mutual relationships. However, most of the variables have an ordinal character (a higher score is better/worse, but there is no information about the distance between the values), while multiple regression requires a continuous scale. Converting the ordinal values to a continuous scale, may have an impact on the results. Next to that, the multiple regression model is linear by nature. However, relations could be non-linear as well. To test whether the selection of a database influences the results of the multiple regression analysis, we analysed all four databases[8] independently.

To test whether the choice for multiple regression and the necessary standardisation of the variables has influenced the estimation results, we made calculations with two alternative methods. One with the Rasch method and one with the Random Forest method. With Rasch we checked whether the standardisation of the original data influences the results.

With the Random Forest approach, a Machine Learning technique which gained great popularity over the past decade, we bypassed a number of disadvantages of multiple regression. We name: (i) variables may have an ordinal character, (ii) there may be non-linear relationships between policy output (the dependent variable) and regressors ('predictors' or 'features' in Machine Learning terms), (iii) the presence of correlations between the set of regressors is treated more realistically (i.e., the problem of multicollinearity), and (iv) the performance of the model is evaluated on independent policy performance data (performance is based on validation rather than fitting to the data at hand). Details of Random Forest are beyond the scope of this paper. Kuhn and Johnson (2016) provide more details about the Random Forest method and its applications.

One disadvantage of Machine Learning techniques such as Random Forest, is that they yield results that are less easy to interpret. However, Random Forest gives as output so-called importance functions which are a measure of the predictive power of individual regressors as we will show.

3 Results

3.1 Dutch municipalities and the energy transition: the present situation

For the *preconditions for governing capacity*, we found that many of the responding civil servants regularly encountered or perceived barriers when they try to implement energy transition policy. This is often due to a lack of technical knowledge within the administration, money and staff (reported by around two thirds of the respondents [see Table 2: Q7 and Q9]). Although the responsible municipal executive is motivated according to 80% of respondents, they do not always receive support from the other city council members and civil servants. A little less than half of the respondents report that only a minority of civil servants is convinced of the urgency of the energy transition (see Table 2: Q5). Although 83% of respondents report that the municipal efforts for the energy transition have increased between 2014 and 2018, a minority (44%) reports that there is no structural budget for the energy transition and 58% report no increase in personnel (see Table 2: Q16 and 17).

[8] The Climate Monitor database and the energy survey of the Association of the Netherlands Municipalities were combined as one database in these analyses.

Table 2. Division of answers for five questions from the PBL 2018 survey (N=163)

Question							
Q9	Does your municipality experience obstructions when developing/implementing energy transition policy within the following domains of knowledge?						
		Knowledge about target groups		Knowledge about the (financial/personnel) consequences of the energy transition for your municipality		Knowledge about processes of change	
		No. of resp.	%	No. of resp.	%	No. of resp.	%
1	Yes	50	31%	108	66%	72	44%
2	Unclear to me	50	31%	36	22%	58	36%
3	No	63	38%	19	12%	33	20%
Total		163	100%	163	100%	163	100%

Question			
Q5	How many of your colleagues (at city hall or other municipal bodies) do your believe are convinced of the necessity of the energy transition?		
		No. of respondents	%
1	Between 60% and 100%	28	17%
2	Between 40% and 60%	60	37%
3	Less than 40%	75	46%
Total		163	100%

Question			
Q7	According to you, how often is there a shortage of technical know-how within your municipal organisation that leads to energy transition policies being hindered or delayed?		
		No. of respondents	%
1	Never	1	1%
2	Almost never	14	9%
3	Incidentally	43	26%
4	Often	67	41%
5	Very often	33	20%
6	Always	5	3%
Total		163	100%
Question			
Q16	Between 2014 and 2018, how did the effort to accomplish the energy transition by the municipality develop?		
		No. of resp.	%
1	It increased	136	83%
2	It remained stable	23	14%
3	It declined	4	3%
Total		163	100%

Question			
Q17	Have the numbers of FTE's for energy transition policy changed over the past four years (2014-2018)?		
1	Yes, it increased	68	42%
2	No	85	52%
3	Yes, it declined	10	6%
Total		163	100%

The *policy output* for the energy transition for the three domains is quantified for each municipality. Figure 2 shows sorted policy output scores of all municipalities in this study. The policy output of the energy transition domains vary widely between the municipalities.

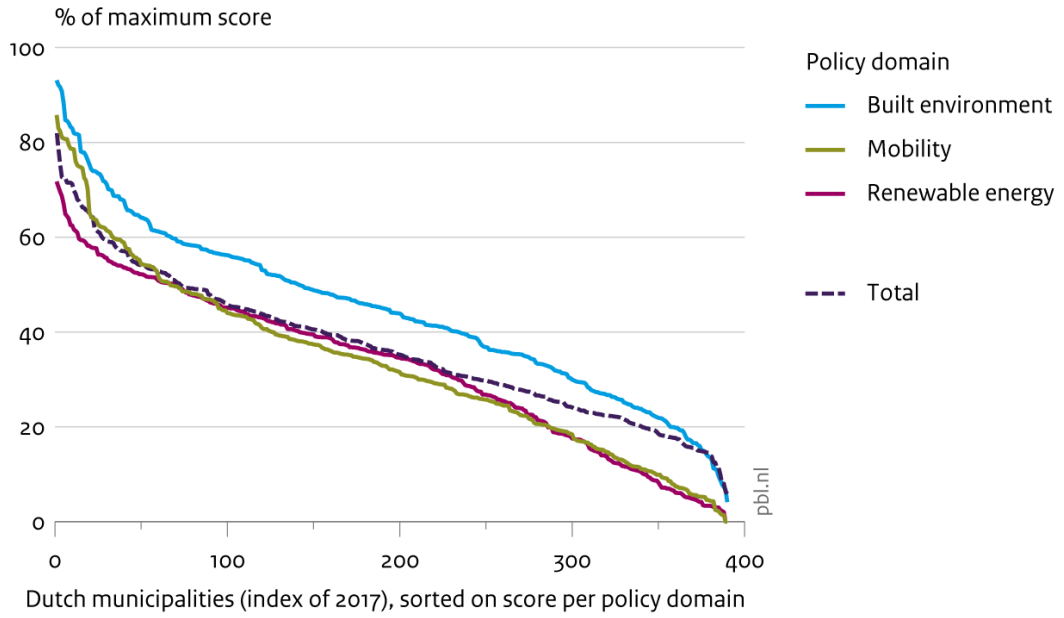

Figure 2. Policy output scores for municipalities (N= 380) for three policy output domains: the built environment, mobility and renewable energy and a total policy output score.

3.2 Relationships between preconditions for governing capacity and policy outputs

We assessed the relationships between the governing capacity and its preconditions and the relevant policy output by estimating multiple regression models. We found that the size of the population (the narrow approach, see above) can explain between 20% and 30% of the differences in policy output, depending on the energy transition domain[9]. If governing capacity and its preconditions are included in the analysis, they explain between 55% and 59% of the differences in policy output. See Table 3.

[9] Standardized regression coefficients (bèta) and R-squared of the effect of population size on policy output for the domains of the energy transition are for built environment: 0.44 (R^2=0.19), mobility: 0.57 (R^2=0.33) and for renewable energy: 0.43 (R^2=0.19). These are values all significant ($p<0.05$).

The addition of the other preconditions for administrative capacity is significant (F-test values for the built environment, mobility, and renewable energy are respectively 16.4, 8.4 and 15.4). The size of the population is only significant related with the policy output for mobility. Motivation, participation and cooperation (other preconditions for governing capacity) are significantly related to the policy output of two to three domains. It is striking that 11 out of 12 of the relationships between the three components of governing capacity and the policy outputs are not significant. We tested whether the results depend on the database used, by executing the multiple regression for three of the four databases independently. The differences between the results of the regressions were minor, see Appendix C.

Table 3. Standardised regression coefficients of the effect of population size, and preconditions for governing capacity, on the policy output for three domains of the energy transition

	Built environment	Mobility	Renewable energy
Population size [ln]	0.16	0.14 *	0.05
Preconditions for governing capacity			
Policy style	-0.04	-0.04	-0.08
Resources	0.10	0.07	0.19 *
Motivation	0.25 *	0.19	0.32 *
Participation	0.22 *	0.07	0.30 *
Cooperation	0.19 *	0.22 *	0.15 *
Governing capacity			
Implementation capacity	-0.05	0.06	-0.04
Decision capacity	0.14	0.14 *	0.06
Accountability capacity	0.11	-0.02	0.02
- Regularly monitoring	0.05	0.08	-0.03
R-squared	*0.59 **	*0.55 **	*0.57 **

* = significant ($p < 0.05$). [ln] = for population size the ln is taken to correct for skewness.

As stated in Section 2.4, to test whether the choice for multiple regression and the necessary standardisation of the variables has influenced the estimation results, we made calculations with the Rasch method and the Random Forest method. The results from the Rasch method are quite similar to those from the multiple regression method (De Vries et al., 2019). The results from the Random Forest method are shown in Figure 3.

Here, variables with an importance of 0 have no predictive power and those with an importance of 100 have maximum predictive power. Data are identical to those applied in Table 3. The results shown in Figure 3 largely coincide with those shown in Table 3, although small differences can be seen. For example, the role of population size for mobility performance (Figure 3, middle panel) is somewhat more pronounced if compared to the regression coefficient shown in Table 3.

We conclude that the results found by applying both Rasch models and the Random Forest analyses, are consistent with the multiple regression estimates shown in Table 3. These findings show that our analysis is not very sensitive to specific model assumptions on scaling, or the specific statistical model chosen (multiple regression versus Random Forest). In other words, it strengthens the robustness of our estimates.

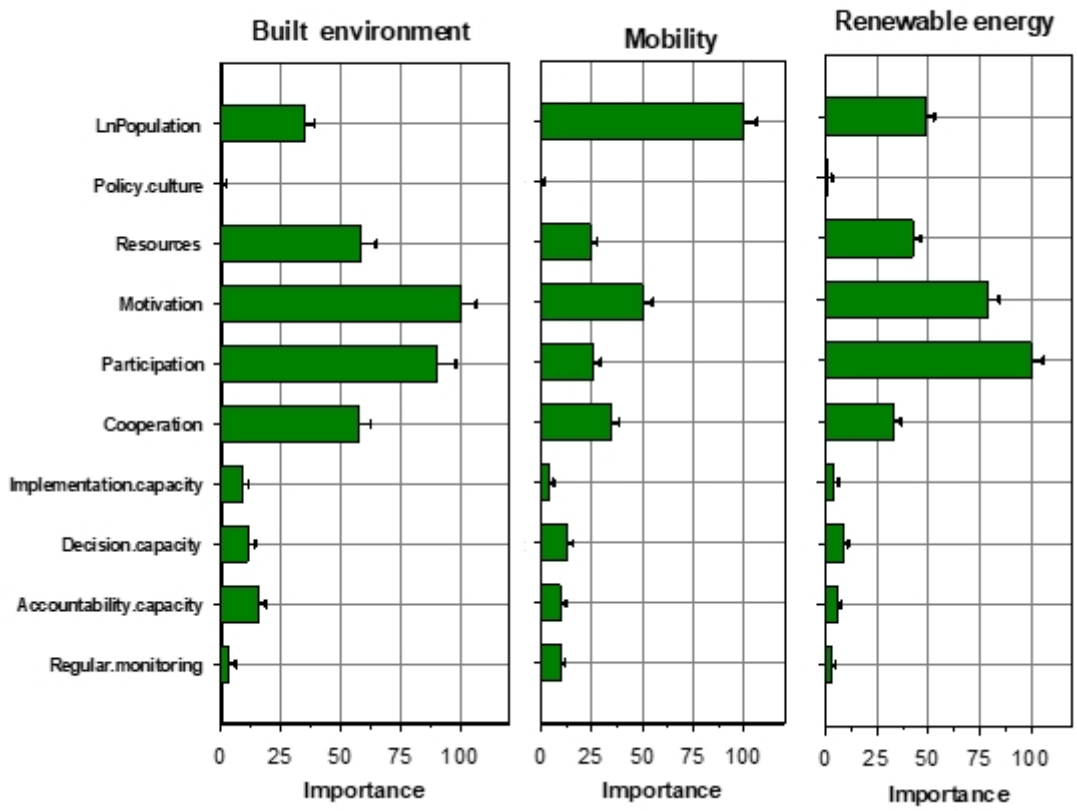

Figure 3. The importance scores for three policy output domains according to the Random Forest analysis: built environment (left panel), mobility (middle panel) and renewable energy (right panel). All variables and underlying data are identical to those shown in Table 3.

4 Discussion

4.1 The contested empirical value of governing capacity

Our analysis did not show a relation between the measured components of governing capacity and policy output. So, it is possible that the questions to measure the components of governing capacity, as formulated by De Vries et al. (2019), were not adequate. On the other hand, not finding a relation underpins the relevance of the discussion among the Dutch public administration scientists concerning the *measurability* of governing capacity (Boogers and Schaap, 2007; Korsten et al., 2007a; Noordegraaf and Vermeulen, 2007; Ringeling, 2007).

Some of these authors (e.g. Ringeling, 2007) even claim that the concept of governing capacity does not have empirical foundations and therefore it is only imaginary. Our measurements of governing capacity represent a degree of quality and are based on self-assessment, which may have introduced certain individual bias. It might be that the concept of governing capacity is limited to its mobilising power for policy, because its operational value is still unproven. On the other hand, we defined a set of preconditions for governing capacity, based on the theory, and we found that these preconditions explain a large part of the variance in the policy output. The, according to the theory indirect causal, relations between the preconditions for governing capacity and policy output are confirmed by our results.

4.2 Comparison with other studies

We compared our study with others who also studied local policy and the energy transition and/or climate policy. According to Kern (2010; 2019) most studies are based on cases of leading cities in metropolitan regions. E.g., Bulkely and Castán Broto (2012) who made a review of 627 worldwide urban experiments. These studies focus on multi-level governance aspects of knowledge and best-practice transfer from and towards cities by using qualitative approaches.

Our study does not focus on the multi-level governance aspects that are regarded as the nexus of the urban politics of climate change by Bulkely and Betsill (2013). Instead, we measured the relation between governing capacity and policy output, based on a quantitative analysis. To do so, we had to simplify the real world. We chose the municipality as central actor and we used just a limited part of the theoretical framework designed by Hoppe et al. (2016). On one hand, this provides too simple a view on the complex world and we undoubtedly have missed complex interactions. On the other hand, we were able to give a quantitative view on the relationship between governing capacity of municipalities and their policy output.

This approach also has an another advantage. For the analysis, we also used data from smaller towns and cities, and municipalities who are not leading in the energy transition. In most case-based studies, these are excluded from the analysis. Including them solves a blind spot in the literature, as observed by Kern (2019). It is important to include them in the analysis, to give a good view on the mechanisms. According to Kern: 'the targets of the Paris agreement are attainable only if initiatives are not limited to a few larger cities in metropolitan regions, with the majority of medium-sized and small cities and towns staying behind' (Kern, 2019, pp. 126).

Finally, we mention that our results are valid for the Dutch situation. We did not find indications of our results also being valid for other countries. Differences between the Dutch policy situation and that in other countries may hugely affect the results.

5 Conclusions and policy implications

We found that by mid 2018, a substantial number of Dutch municipalities have not or hardly begun with the implementation of energy transition measures. The preconditions for governing capacity differ largely between municipalities. We name resource availability and motivation of the administrative staff. Also, the policy output for the energy transition varies widely between the municipalities.

We were not able to establish a direct relationship between the governing capacity and energy transition policy output. The operational value of governing capacity is likely to be limited. However, we were able to establish significant relationships between the preconditions for governing capacity and energy transition policy output. A larger population, a higher motivation of the administrative staff, more participation of citizens and businesses, and the cooperation with other municipalities and governmental bodies, all result in a higher energy transition policy output. Around 25% of the variance in the energy transition policy output can be explained by the size of the population, and thus legitimised the narrow approach of governing capacity. However, the addition of the three other preconditions for governing capacity mentioned (the broad approach of governing capacity), led to explained variances in policy output which are much higher: between 55% and 59%.

To accelerate the local Dutch energy transition by improving the preconditions for governing capacity, energy policy might focus on merging smaller municipalities to larger ones. But it is probably more efficient to focus on less politically sensitive options, such as stimulating the motivation of the local administrative staff, improving the participation of citizens and local businesses, and stimulating the cooperation with other municipalities. Such a cooperation is

envisaged in the Dutch National Climate Agreement (Klimaatakkoord, 2019), because all Dutch municipalities are obliged to cooperate with others to formulate a shared Regional Energy Strategy (RES).

Future research could focus on the question whether the concept of governing capacity has also empirical value. This can be important for measurements of governing capacities of individual municipalities and other governmental organisations, as current measurements are based on less transparent methods. Maybe an alternative approach can be developed to measure governing capacity and its components more directly. Therefore a clear separation between governing capacity itself and its causes and effects is required. that means that the concepts should be measured and analysed independently from each other.

A second focus for future research can be whether the conclusions of this study can be generalised for other policy fields, other kinds of transitions and other countries. Though our approach is focused on the Dutch governance context. The relations between governing capacity and policy output we found, might also be proven for other countries such as France or the USA. However, future research for other countries should take into account differences between constitutional and political design of the country concerned. Maybe other levels than municipalities of government might be more applicable.

Finally, our model could be improved by using other or more accurate variables within the existing operational frame. This may start at the very beginning, with the design of the data collection process, to overcome biases related to self-assessments (i.e. of governing capacity) and even in expert judgement.

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APPENDIX A: List of variables of the model for governing capacity

Table A contains all variables used to construct the indicators in our model. The variables are divided over three tables, one for each assumed causal step between governing capacity and policy performance. Here policy performance is limited to policy output as policy outcome has been excluded from the model. Also the sources of all variables are included, see Key. The tables are translated from Dutch. The original can be found in De Vries et al. (2019).

Key:

TELxx	variable from TELOS Governance Monitor (2017)
PBLxxx	variable from PBL municipal survey on the Energy Transition (2018)
VARxxx	variable from shared data service of Climate Monitor (Rijkswaterstaat, 2017) and Waarstaatjegemeente.nl (Vereniging Nederlandse Gemeenten, 2017)
TELLAB	internal data on energy performance of buildings from TELOS (2017)

TABLE A1 – Variables to measure preconditions for governing capacity

Preconditions for governing capacity	
Municipal organisation	
Policy Style:	
PBL001	Learning organisation
PBL002	Careful feedback on personnel
Resources:	
knowledge	
PBL003	Frequency of technical knowledge shortage
PBL004	Self-reliance technical knowledge
PBL005	Shortage of target group knowledge
PBL006	Knowledge financial/personnel impact energy transition
PBL007	Knowledge about societal change processes
professionality	
PBL008	Knowhow office personnel
PBL009	Knowhow blue collar
PBL010	Knowhow politicians
PBL011	Social skills office personnel
PBL012	Social skills blue collar
PBL013	Social skills politicians
job experience	
PBL014	Job experience in years
budget size	
PBL015	Degree of specification of budget for energy transition
TEL21	Financial stimulation of sustainability policy
specified budgets	
PBL016	Specification of budget for energy transition yes/no
PBL017	Structural specified budget for energy transition yes/no
service level (FTE)	
PBL018	Number of FTE's for the energy transition by category
PBL019	Change in the number of FTE's for the energy transition
Motivation:	
'will to act'	
PBL020	Percentage of motivated staff
PBL021	Acknowledged importance of target group knowledge
PBL022	Acknowledged importance of financial/personnel implications knowledge
PBL023	Acknowledged importance of knowledge of societal change
PBL024	Amount of effort given for energy transition
PBL025	Change in amount of effort given for energy transition

PBL026	Effort for climate mitigation
PBL027	Effort for energy conservation

continuity

PBL028	Continuity of endeavour for energy trans. yes/no

perseverance

PBL029	Attitude of municipal executive for energy transition
PBL030	Attitude of council of Major and other municipal executives
PBL031	Attitude of Municipal Council

spill-over to other sectors within municipal organisation

TEL11	Breadth of sustainability vision
TEL12	Consolidation of sustainability within council of Mayor and aldermen
TEL13	Consolidation of sustainability among personnel
VAR151	Application of energy standards in purchasing policy
VAR152	Actively asking suppliers for CO_2 footprint

example for others

PBL032	Effort given to be a sustainable role model for citizens
PBL033	Conservation of energy in municipal buildings yes/no
TEL01	Corporate sustainability policy
TEL02	Purchasing policy
TEL04	Level of municipal climate targets
TEL09	Sustainability level of Coalition Agreement Municipal executives
TEL10	Municipal Vision on sustainability
VAR134	Internal campaign for sustainability for personnel/management
VAR135	Campaign for energy conservation in utility sector
VAR147	Application of energy monitoring in municipal buildings
VAR148	Implementing required measurements for energy conservation

Stakeholders

Participation in networks:

PBL034	Self-perception of cooperation performance municipality
PBL035	Insight in needs and preferences of citizens sustainability
TEL05	Participation of citizens within sustainability policy
TEL06	Cooperation with local businesses
TEL07	Cooperation with civil unions and associations
TEL20	Facilitating cooperation as a whole
VAR066	Corporate sustainability platform
VAR067	Stimulating local firms and associations for sustainable innovation
VAR072	Cooperation with employer associations
VAR079	Number of companies within corporate sustainability platform
VAR140	Involving citizens in sustainability policy on utility sector

Governmental cooperation:

PBL036	Cooperation with Province
PBL037	Cooperation with Public Environmental Service Provider
PBL038	Cooperation with Dutch network of large employers
PBL039	Cooperation with Dutch network of smaller employers
PBL040	Cooperation with the association of Dutch municipalities
PBL041	Cooperation with the Ministry of Infrastructure
PBL042	Cooperation with neighbouring municipalities
PBL043	Cooperation through international twin city partnership
PBL044	Cooperation with Water Safety and Quality Board
PBL045	Cooperation with the European Union
PBL046	Perception of lucidity of national govern. goals
PBL047	Perception of lucidity of provincial goals
PBL048	Regional cooperation of Environmental Service Providers
TEL08	Inter-municipal cooperation

Key:	
TELxx	variable from TELOS Governance Monitor (2017)
PBLxxx	variable from PBL municipal survey on the Energy Transition (2018)
VARxxx	variable from shared data service of Climate Monitor (Rijkswaterstaat, 2017) and Waarstaatjegemeente.nl (Vereniging Nederlandse Gemeenten, 2017)
TELLAB	internal data on energy performance of buildings from TELOS (2017)

TABLE A2: Variables to measure governing capacity

Governing capacity

Implementation capacity:

PBL049	Meeting requirements of the national government
PBL050	Meeting requirements of the provincial government
PBL051	Meeting requirements of the citizens
PBL052	Meeting requirements of municipal executive
PBL053	Meeting requirements of Municipal Council

Decision capacity:

primary indicator

PBL054	Score on statement 1 for Decision Capacity
PBL055	Score on statement 2 for Decision Capacity
PBL056	Score on statement 3 for Decision Capacity

secondary indicator

PBL057	Perception of lucidity of council of Mayor and aldermen goals
PBL058	Perception of lucidity of Municipal Council goals

Accountability capacity:

primary indicator

PBL059	Score on statement 1 for Accountability Capacity
PBL060	Score on statement 2 for Accountability Capacity
PBL061	Score on statement 3 for Accountability Capacity

secondary indicator

TEL22	Regularly Monitoring

Key:	
TELxx	variable from TELOS Governance Monitor (2017)
PBLxxx	variable from PBL municipal survey on the Energy Transition (2018)
VARxxx	variable from shared data service of Climate Monitor (Rijkswaterstaat, 2017) and Waarstaatjegemeente.nl (Vereniging Nederlandse Gemeenten, 2017)
TELLAB	internal data on energy performance of buildings from TELOS (2017)

TABLE A3: Variables to measure policy output for the built environment, mobility and renewable energy

Policy performance

Policy output built environment

Municipality as partner:

achieving national governmental goals

PBL062	Accomplished energy conservation yes/no
PBL063	Monitoring of energy conservation performance
PBL064	Publishing results of energy conservation measurements

cooperation with the Water Safety and Quality boards

PBL065	Degree of cooperation with Water Boards
VAR085	Soil policy
VAR088	Integral water management

performance of Housing Associations

PBL066	Insulation of public housing
PBL067	Reduced interest on loans for Housing Associations
PBL068	Alternative ways of fin. stimulating Housing Associations
PBL069	Municipal support for Housing Associations yes/no
PBL070	Municipal subsidies for Housing Associations
VAR004	Financial resources for insulation of existing houses
VAR022	Financial stimulation of Housing Associations

Municipality as service provider:

energy information office

VAR013	Own communication channel on sustainable housing
VAR014	Displaying best practices on sustainable housing
VAR017	Local subsidy on sustainable housing
VAR018	Local interest reduction on special loans
VAR019	Local financial backup in case of loss
VAR041	Amount of subsidies (in €)
VAR043	Amount of loans (in €)
VAR136	Presence of an energy information office

distribution of building permits

VAR030	Allowing changes in Local Building protocol
VAR031	Financial assistance for commercial initiatives for sustainable building
VAR044	Number of ad-hoc changes
VAR061	Preparedness for alternative trajectories for companies

housing vision and other legal plans

VAR001	Ambitions in Coalition Agreement municipal executives
VAR002	Upgrade to insulation level B included

policy on housing target groups

PBL071	Insulation of commercial tenant housing
PBL072	Insulation of private property
PBL073	Targeting per letter of utility real estate
PBL074	Targeting per letter of commercial real estate
PBL075	Targeting per letter of low-income tenants
PBL076	Targeting per letter of entrepreneurs
PBL077	Targeting per letter of environmental enthusiasts
PBL078	Targeting other groups per letter
PBL079	Targeting of shared ownership collectives
VAR010	Timely adjustment of communication strategy
VAR011	Local energy saving ambassadors
VAR012	Public meetings for residents
VAR015	Municipal campaign on sustainable housing
VAR020	Financial compensation for low-income tenants
VAR021	Financial compensation for shared ownership collectives

directing role on the phase-out of domestic natural gas heating

PBL080	Actively taking part in CNG phase-out
PBL081	Amount of progress made in CNG phase-out
VAR029	Facilitating CNG phase-out for domestic heating

Municipality as legislator:

EPC norms

VAR024	Enforcement of EPC norm for houses
VAR059	Enforcement of EPC norm for companies
VAR129	Enforcement of EPC norm for utility buildings

Environmental Management Act

VAR037	Percentage of municipal buildings meeting lawful requirements
VAR048	Active influencing of companies
VAR060	Enforcement of the 5-year energy conservation norm
VAR077	Percentage of enforcement of the 5-year energy conservation norm
VAR128	Enforcement for utility buildings
VAR154	Enforcement for municipal buildings

energy efficiency labels for buildings

VAR016	Visibility of energy labels
VAR279	Mean energy efficiency index of government buildings
VAR350	Percentage of labelled houses
TELLAB	Cumulative increase of energy label efficiency levels

municipal heating plan

PBL082	Presence of a heating plan yes/no
PBL083	Phase of preparation of a heating plan
PBL084	Amount of progress made in natural gas phase-out
PBL085	Amount of progress made in natural gas phase-out houses only
PBL086	Application of cold and heat storage
PBL087	Application of heated air pumps
PBL088	Application of low-temperature heat networks
PBL089	Application of passive cooling of buildings
VAR089	Presence of local plans for phase-out of CNG

exceeding legal requirements

PBL090	Demanding excellent en. efficiency above legal level
VAR025	Demanding excellency for new building and renovation
VAR130	Demanding excellency for municipal buildings

supervision during building projects

VAR003	Monitoring of resulting efficiency built houses
VAR026	Enforcing and control upon excellent energy efficiency (above lawful level)
VAR027	Supervision on housing associations
VAR042	Number of physically inspected newbuilt houses

new building projects (from scratch)

PBL091	Building of zero net energy usage houses
PBL092	Building without connection to the CNG network
PBL093	Application of energy efficiency inspection of new buildings

Policy output mobility

Municipality as partner:

tuning of the municipal mobility plan on higher levels

PBL094	Frequency of tuning consultations
PBL095	Municipal appreciation of tuning consultations
VAR172	Joining national/regional campaigns on sustainable mobility

active influencing and participation in Public Transport tendering

PBL096	Perception of level of influence gained on regional tender
PBL097	Perception of level of influence exerted on regional tender
VAR167	Stimulation of usage of bicycles, public transport and walking
VAR178	Lobbying for more/better bus stops and bicycle parking lots
VAR189	Environmental demands as part of the regional tender of public transport

Municipality as service provider:

agreements with employers commuting

PBL098	Presence of (voluntary) agreements with employers
VAR170	Redirecting citizens and companies to subsidies
VAR183	Application of sustainable mobility management by employers
VAR184	Campus traffic management (employers)
VAR197	Number of employers with voluntary mobility agreements

subsidies and tax exemptions for civil servants

VAR187	Stimulation of commuting by bike or public transport
VAR188	Curbing the number of business trips

facilitation of distribution of alternative fuels

VAR331-338	Number of gas stations with alternative fuels

public electrical charging facilities (cars and bicycles)

VAR173	Charging facilities for electric bikes
VAR339	Total number of charging sockets (cars)
VAR340	Number of public regular charging points (cars)
VAR341	Number of semi-public regular charging points (cars)
VAR342	Number of public fast-charge points (cars)
VAR343	Number of semi-public fast-charge points (cars)

local (municipal) subsidies

PBL099	Local subsidy for more sustainable vehicles
VAR171	Stimulating and promoting local commercial partners

subsidised target group transports (disabled persons/elderly/regional support taxi)

PBL100	Extent wherein collective social target group transports are being considered as too fragile for changes to demand strict environmental targets in the tendering
VAR181	Application of the 'broad mandate' of a municipality in the tendering of social collective transport
VAR327-330	Alternative fuel taxis

car sharing

VAR174	Creating special parking lots for shared vehicles

carpooling

PBL101	Municipal investment in carpooling yes/no
PBL102	Municipal investment in public carpooling
PBL103	Municipal investment in physical space

Municipality as legislator:

car park management

PBL104	Enforcement of local car parking policy
PBL105	Limiting the number of available parking lots
PBL106	Parking permits for street residents only
VAR196	Percentage of public space with enforced parking management

combustion engine restriction zones

PBL107	Presence of a restriction zone within municipality
VAR179	Reduction of fossil combustion within built environment
VAR180	Stimulation of sustainable vehicles within built environment

car-free zones

VAR176	Direction of car-free public spaces
VAR177	Pleasant walking and strolling areas
VAR194	Percentage of commercial space made non-accessible by car

spatial clustering for mobility management

VAR164	Concentration of utility buildings near public transport

lower speed limit because of air quality

PBL108	Driving speed reduction yes/no

bus lanes or other special infrastructure
PBL109 Special infrastructure for public transport yes/no

stimulating safe and environmentally friendly pick-up and drop off children at schools
PBL110 Discouraging parents to use cars to school yes/no

municipal organisation as best practice
PBL111 Sustainability of vehicle fleet
VAR185 Accounting for sustainability when purchasing cars

Policy output renewable energy

Municipality as partner:

municipal performance on regional renewable energy production
PBL112 Conduction of a trial drilling for geothermic heat
VAR081 Investigation of the local potential of RE
VAR082 Measurable targets for amount of RE in energy mix
VAR083 Yearly update on RE-development in municipality
VAR096 Development in local production of renewables
VAR211-214 Percentages of renewable electricity in 2015
VAR288-290 Usage of biomass for energy in 2017
VAR299-300 Maximum installed wind power on land
VAR311 Maximum power of PV's per 1000 houses

municipal cooperation with the power distributors
PBL113 Appreciation of the power network controller
PBL114 Appreciation of the energy producer
VAR035 Cooperation with energy network controllers for sustainable housing
VAR095 Local orchestration of renewables supply and demand

Municipality as service provider:

permits for renewable energy production
VAR099 Clearing permit procedure obstructions
VAR100 Streamlining of permit procedure
VAR102 Application of soil plan for energy production and storage
VAR107 Discount on municipal fees
VAR120 Percentage of exceptions made in procedure

financial support of renewable energy production
PBL115 Installing PV panels on houses (subsidy)
PBL116 Installing small wind turbines
PBL117 Installing PV panels on plots of land
PBL118 Installing large wind turbines
PBL119 Using biomass for the production of heat
PBL120 Using biomass for the production of electricity
PBL121 Using solar panels for direct heating
VAR103 Municipal subsidy for homeowners
VAR104 Municipal sustainability credits
VAR105 Municipal revolving fund
VAR106 Municipal financial backing in case of deficit
VAR121 Municipal subsidies in €
VAR122 Municipal credits in €
VAR123 Municipal investments in renewables €
VAR291-294 National subsidies used for biomass
VAR296-297 National subsidies used for heated air pumps
VAR305-308 National subsidies used for solar heat
VAR312 National subsidies used for PV's until 2013
VAR314 National subsidies used for PV's in 2015
VAR363 Number of municipal sustainability credits granted

offering municipal real estate for the production of renewables
PBL122 Offering roofs of municipal buildings to other parties
VAR113 Making municipal real estate available for renewables

supporting of citizen collectives for the production of renewables

PBL123	Presence of any citizen collective yes/no
PBL124	Municipal support for citizen collectives
PBL125	Presence of self-supporting citizen collectives
VAR108	Stimulation of citizen participation in renewables
apps and tools for citizens	
PBL126	Municipality pays for licenses of energy tools
informing local residents	
VAR090	Accessible information hub for renewables
VAR092	Stimulating citizens to produce energy themselves
VAR097	Promoting inspiring citizen projects and best practice
municipality as legislator:	
CO_2 reduction	
PBL127	Municipality commits itself to climate mitigation
PBL128	Municipality measures its CO_2 reduction
PBL129	Municipality publishes CO_2- reduction results
VAR132	Continuous monitoring CO_2 emissions and energy usage
VAR161	CO_2 reduction is part of municipal mobility policy
exemplary role	
PBL130	Impact of the exemplary role on the municipality
VAR109	Purchase of locally produced electricity by municipal organisation
VAR110	Financial participation of municipal organisation
VAR111	Own production of RE in municipal buildings
VAR112	Own production of RE on municipal grounds
VAR114	Usage of own biomass for municipal gardening
VAR124	Percentage of self-produced RE in usage of municipal organisation
VAR125	Political ambition to achieve climate neutrality
VAR126	Implementation plan for climate neutrality
safety and fraud control on RE subsidies and installations	
PBL131	Inspection of RE installations
influence of RE on spatial plans and legislation	
VAR084	RE is an integral part of spatial policy
VAR086	RE is an integral part of public green policy
VAR087	RE is an integra part of the mobility plan
VAR098	Spatial reservations for RE in legal plan
VAR119	Percentage of legal spatial plans with a reservation for RE

APPENDIX B: Description of the data sources

Our operational model makes use of four data sources. These are:

- Waarstaatjegemeente.nl (Association of Netherlands Municipalities, 2017) contains an energy survey of the Dutch Association of Municipalities (VNG), that contains data about Dutch municipalities for 2016. The questionnaire counted around 200 questions about several energy policy subdomains such as housing, services, utilities and renewable energy. Questions were formulated for the retrieval of precise data (such as energy usage quantities) as well as for the collection of the array of policy measurements put in place. A total of 281 municipalities responded. We downloaded the results of this questionnaire via the www.waarstaatjegemeente.nl website of the VNG[10].
- The Climate Monitor is a database of the Dutch Ministry of Infrastructure that comprises data about the energy demand and usage of Dutch municipalities, like energy indexes of dwellings and buildings, figures about mobility such as registered petrol stations and electric car charging facilities. The Climate Monitor is mainly based on data originating from the Dutch Statistics Agency (CBS), but contains also information from several smaller sources, such as the above mentioned energy survey of the Dutch Association of Municipalities[11]. Most parts of this database cover all 388 Dutch municipalities in 2017.
- The Governance Monitor for Sustainable Municipalities is a research tool developed by Telos (Tilburg University) that gives qualitative scores for 22 subdomains of sustainability, and aggregated categories that consist of selections of these 22 theme scores. The data is collected from an extensive amount of policy documents from all 388 municipalities in 2017.
- The PBL (Netherlands Environment Agency) survey from 2018 is based on a questionnaire of about 150 questions. Most questions are collecting data on the preconditions and the three components of governing capacity. The remainder of the questions concern the policy output of Dutch municipalities within the three domains of the energy transition (built environment, mobility and renewable energy). Municipal employees are requested to fill in the questionnaire. They were asked about their experiences during the period form 2014-2018 about developing the local energy policy. This survey has been completed by 163 out of 380 municipalities in 2018.

[10] The results of the VNG energy survey were also available within the Climate Monitor. However we chose to download these data files separately, because the VNG guaranteed us that the ones supplied by www.waarstaatjegemeente.nl were the most recent and were even corrected afterwards in some cases.
[11] As we replaced the copied VNG energy survey data from the Climate Monitor for the first hand data of the VNG on www.waarstaatjegemeente.nl, we consider the Climate Monitor and the VNG energy service as one single source within our supplemental multiple regression analysis (Appendix C) on the combining of databases.

APPENDIX C: Effects of database selection on the multiple regression outcomes

We tested whether the results depend on the database used we executed a multiple regression for three of the four databases independently. Below the results of the three regressions and the regression made with the combination of the four databases.

Most analyses show a clear influence of the motivation of the municipal organisation. For most data sets there can also be seen an influence in the participation in networks. A clear conclusion about the relation between cooperation between governmental bodies and the policy output cannot be drawn. That is because the Climate Monitor database does not contain variables on cooperation, and therefore cannot be used for a calculation. The influence of governing capacity itself remains limited. Though we can significance in the case of decision capacity within the mobility policy output, this effect is erased when all data sets are combined.

TABLE C1:

Built environment	PBL survey	Governance monitor (Telos)	Climate Monitor (incl. waarstaatjegemeente.nl)	Combination of all data sets[12]
Preconditions for governing capacity				
Policy style	-0.05			-0.03
Resources	0.16 **	0.05		0.12
Motivation	0.29 **	0.26 **	0.30 **	0.28 **
Participation in networks	0.24 **	0.11 *	0.39 **	0.26 **
Cooperation between governmental bodies	0.16 *	0.01		0.20 **
Governing capacity				
Implementation capacity	-0.11			-0.07
Decision capacity	0.10			0.12
Accountability capacity	0.13	0.03		0.10
R-squared	*0.44* **	*0.15* **	*0.33* **	*0.55***

Significance levels: * = p < 0.1, ** = p < 0.05

[12] These figures do not match the ones in table 3 in the main article, because population size is Table C1, C2 and C3 excluded from the regression analyses.

TABLE C2:

Mobility	PBL survey	Governance monitor (Telos)	Climate Monitor (incl. waarstaatjegemeente.nl)	Combination of all data sets[11]
Preconditions for governing capacity				
Policy style	-0.01			-0.03
Resources	0.20 **	0.05		0.10
Motivation	-0.03	0.33 **	0.34 **	0.21 **
Participation in networks	0.15	0.07	0.37 **	0.16
Cooperation between governmental bodies	0.24 **	0.05		0.24 **
Governing capacity				
Implementation capacity	-0.05			0.02
Decision capacity	0.21 **			0.14
Accountability capacity	-0.10	0.03		-0.05
R-squared	*0.18* **	*0.20* **	*0.35* **	*0.41* **

Significance levels: * = p < 0.1, ** = p < 0.05

TABLE C3:

Renewable energy	PBL survey	Governance monitor (Telos)	Climate Monitor (incl. waarstaatjegemeente.nl)	Combination of all data sets[11]
Preconditions for governing capacity				
Policy style	-0.13 *			-0.11
Resources	0.38 **	0.10 *		0.20 **
Motivation	0.23 **	0.28 **	0.29 **	0.27 **
Participation in networks	0.15 *	0.04	0.48 **	0.35 **
Cooperation between governmental bodies	0.11	-0.01		0.16 **
Governing capacity				
Implementation capacity	0.11	-0.01		-0.08
Decision capacity	-0.08			0.07
Accountability capacity	0.07			0.03
Implementation capacity	0.01	-0.01		0.01
R-squared	*0.37* **	*0.13* **	*0.42* **	*0.53* **

Significance levels: * = p < 0.1, ** = p < 0.05