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Wind Power Approval and Decentralization: Evidence from the Swedish Greens

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Abstract

Green parties are commonly seen as strong proponents of wind power. This paper presents an alternative view from Sweden's highly decentralized institutional setup, where municipalities can veto wind power applications on arbitrary grounds. By examining data from voting records in the municipal council from a sample of 300 applications, I find that the Greens are not more inclined to vote for approval than the remaining three major parties. A likely mechanism is that even if the Greens have a stronger preference for climate policy than the other parties, they are also more concerned about the local environmental disamenities associated with wind power. Consistent with this finding, I examine less detailed data from a larger sample of about 900 applications, finding no evidence that an increase of Green seats in the municipal council is associated with any increase in the probability of approval.

Keywords: Wind power; decentralization; negative externalities; electricity market; energy transition; climate policy; elections; NIMBYism; Green Party

JEL: D62, D72, H73, P18, Q48

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1 Introduction

Fighting climate change is a cornerstone of Green politics, with “Green” meaning the ideological framework laid down by the [Global Greens \(2017\)](#) and adopted by more than 100 member parties worldwide. The preference for climate policy is often manifested through strong support for wind power, especially among national-level Green politicians. However, wind power is also associated with local environmental disamenities through visual and acoustic disturbances for local residents and worsened conditions for wildlife, especially in pristine areas ([Zerrahn, 2017](#)). Since protection of the local environment is also a prominent feature of Green ideology, local decision-making among the Greens reflects a delicate balance between climate policy versus concerns for the local environment. In addition, the widespread practice of participatory democracy among the Greens ([Global Greens, 2017](#)) likely amplifies the influence of local opposition on political decision-making. In general, local opposition towards renewable projects is often quoted as a central challenge for the energy transition ([Fabra and Reguant, 2024](#)), calling for a deeper understanding of these mechanisms, not the least within the Green movement. In Europe, voter support for Green parties is steadily increasing, and the parliamentary group incorporating the Greens now holds 10 percent of the seats in the European Parliament ([European Parliament, 2019](#)), underlying the importance of understanding how Green politics shape the energy transition.

The Swedish approval process for wind power creates conditions where concerns for the local environment likely dominate preferences for reduced emissions. Beginning in 2009, municipalities may veto applications for wind power without justifying their decision (although applications also have to pass environmental assessments conducted by non-political county officials). Further, there are almost no economic benefits for municipalities accepting wind power, such as corporate taxes or other institutionalized compensations, and local job creation is likely very limited ([Aldieri et al., 2020](#)). Given this institutional setup, I conjecture that the Greens should be significantly more positive towards wind power in national than local politics. This mechanism can be interpreted in terms of Oates’ *Decentralization Theorem*, stating that decentralization will lead to the underprovision of goods with positive inter-jurisdictional externalities ([Oates, 1972](#)). In this case, these externalities are reduced emissions and electricity prices. Similar mechanisms are likely at play also within other parties active on both the national and local levels, but

the trade-off between global and local environmental concerns is likely more delicate among the Greens.

In this study I examine data on the voting behavior of councilors from votes on 300 wind power applications that received an initial decision between 2011-2023. I find that the approval rate of the Greens is in fact lower, albeit not statistically different, from the three major parties in local politics (The Social Democrats, the Centre Party, and the Moderates). These three parties hold on average 70 percent of the seats in the local councils. I perform several robustness tests. First, I compare voting behaviors when both parties are in the ruling coalition. Second, I compare voting behavior in votes that are not unanimous. Both tests confirm the results from the baseline comparison. Third, I examine decision outcomes from non-political environmental assessments (by the county administration and higher environmental courts) where at least one party has voted for rejection. I find no indications that the Greens' rejection votes are more aligned with the rejections by the non-political bodies than other parties' rejection votes.

I then examine less detailed data from a complete sample of all 900 applications from the same period, where I cannot observe if rejections are due to the municipal veto or failure to pass the environmental assessment. Conditional on the inclusion of fixed effects and controls, I find no statistically significant difference between the probability of approval and Green representation in the council.

In relation to my research question, the most closely related study is [Lauf et al. \(2020\)](#), which examines the association between Green representation and a large set of other socio-demographic variables and installed wind power capacity on municipality level in both Sweden and Germany. That study does not find any relationship between installed wind power capacity and Green representation in either country, but data are cross-sectional, and the study only examines installed capacity, not applications. In a related study from the US, [Dorrell and Lee \(2020\)](#) find that Democrat governors have a slightly positive effect on wind power expansion due to favorable subsidy schemes and other regulatory interventions.

Previous studies on the effect of Green representation in Swedish municipalities demonstrate that the Greens issue more environmental fines ([Sjöberg, 2016](#)) and pursue more environmental policies in general ([Folke, 2014](#)) compared to other parties. The results in the present paper

align with these studies, given that wind power projects are associated with negative local environmental externalities.

Another related strand of literature studies the effect of wind power expansion on election results. In a German study, [Otteni and Weisskircher \(2022\)](#) employ a two-way fixed effects OLS estimator concluding that the construction of wind turbines in a municipality boosts the electoral support for both the Greens and the populist anti-wind power party Alternative für Deutschland. In another German study, [Germeshausen et al. \(2025\)](#) instead find that the construction of wind turbines is associated with lower support for the Greens if the turbines are placed close to the municipality center. In a survey experiment in Switzerland, [Umit and Schaffer \(2022\)](#) show that exposure to wind turbines does not affect either electoral turnout or vote choice.

An analysis of the complexities of wind power resistance in Sweden is given by [Anshelm and Simon \(2016\)](#), concluding that such resistance has grown stronger through the years and will likely hinder future wind power development. [Wretling et al. \(2022\)](#) argue that introducing financial compensation for municipalities accepting wind power will likely be crucial for a continued Swedish wind power expansion. [Devlin \(2005\)](#) discusses various sources of resistance towards wind power in Sweden, e.g., that the benefits in terms of lower electricity prices disproportionately favor urban areas far away from the sites. [Ek et al. \(2013\)](#) study the determinants of wind power expansion in Sweden, finding that commercial incentives have likely been a more important determinant of the geographic distribution of wind power in recent years, while the period up until 2006 was characterized by local individual wind energy “enthusiasts”. In line with this result, [Lundin \(2022\)](#) studies the effect of geographically differentiated electricity prices on regional differences in wind power expansion, finding that prices affect the locational choices of large commercial firms but not small, often locally owned, firms.

2 Institutional background

2.1 Wind power expansion in Sweden

Before the turn of the century, large-scale wind power plants were virtually non-existent in Sweden. A green electricity certificates system was introduced in 2003, which, together with a reduction in investment costs and inflow of international capital, led to a sharp increase in

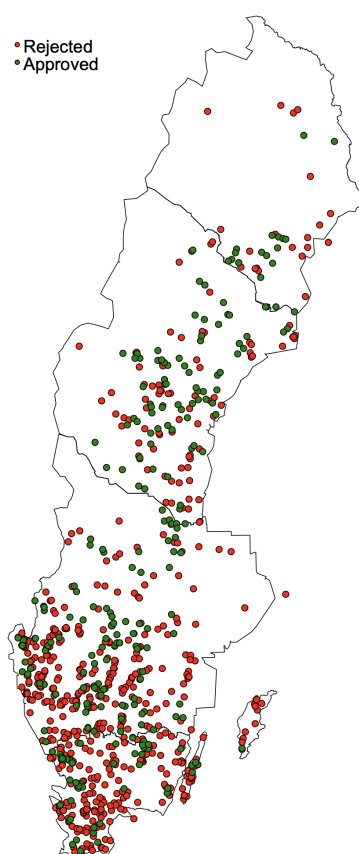
installed capacity beginning in 2007 ([Swedish Energy Agency, 2021](#)). Wind power is still expanding steadily, with the rate of increase being approximately constant during the last decade. Although the certificate system was important for creating initial investments, certificate prices have steadily declined with lowered production costs. The system is currently being phased out, and from 2022, new plants are no longer awarded certificates. In terms of output shares, the Swedish market was in 2021 comprised of hydro (43 percent), nuclear (31), wind power (16), other thermal (10), and solar (1) ([Swedish Energy Agency, 2022](#)).

Although investors started submitting applications soon after introducing the certificates, due to the long lead times, it was not until 2010 that the share of wind power reached 2 percent of total output. Since then, wind power has expanded steadily, and in 2021, the share was 16 percent. Figure 1 depicts all applications receiving their initial approval decision between 2009 and 2021, with green dots for applications that have been accepted and are currently either built or in the planning phase, and red dots for rejections. Smaller projects with only one or two turbines are excluded since these projects are mainly non-commercial and sited on the owners' property. Although more applications are located in the south, the median capacity of a project in the south is about one-third of the median capacity in the less densely populated north.

2.2 Local political institutions and the Greens

The municipalities form the lowest administrative level. There are 290 municipalities, with a median population of 16 thousand. Elections are held every fourth year in tandem with the national election. The municipal council is the equivalent of the national parliament, and the vote shares determine the seat shares in the council. Although the council takes a majority of the decisions on wind power applications, a third are delegated to the municipal board. The board members are both from the ruling coalition and the opposition, although the ruling coalition also has a majority on the board. The board's primary function is to enable a less bureaucratic decision-making process when there is little uncertainty regarding the majority outcome of a vote. Further, about ten percent of the decisions are technically delegated to a specialized municipal committee, such as the land use committee. Sometimes these decisions are also preceded by a vote, so that party-specific preferences are revealed. There is no pre-determined legislation regarding the appropriate decision-making level within the municipality, and the council decides

Figure 1: Approved and rejected wind power applications



Note: Approved and rejected wind power applications 2009-2020. Green indicates accepted, red is rejected. Only projects with three or more turbines are included.

if it prefers to delegate the decision to another decision-making body. In the analysis, I do not distinguish between the voting levels within the municipalities but simply refer to these as “municipal votes”.

After the seats have been allocated, negotiations are initiated and a ruling coalition is formed, which usually holds a majority of the seats in the council. Although the mean support for the Greens in the local elections is only five percent, they are in 30 percent of all ruling coalitions. In 40 (30) percent of these constellations, the remaining ruling parties can be classified as left (right). The data on voting records from the municipality votes reveal that voting behavior within the ruling coalition is not always aligned, necessitating an examination of party-level voting records.

2.3 The application process and coding of decision-making variables

A. Pre-investigation and public hearing

Before an application is submitted, the investor investigates the proposed site and contacts land owners to ensure access to the land. This process is usually comparatively thorough, spanning 1-4 years ([Vattenfall, 2023](#)). The investor then organizes at least one public hearing concerning the proposed project, which is obliged by law (chapter 6, the Swedish Environmental Code). The hearing is intended for nearby residents, politicians, and other stakeholders. If the investor already in this phase perceives that the municipality will not accept the project, it usually abstains from submitting a formal application. A survey report commissioned by the Energy Agency notes that the municipality may already in this phase informally communicate that they will exercise their veto, which is also quoted as the main reason why investors decide to abandon the project after a public hearing ([Swedish Energy Agency, 2022](#)). Since the large data set includes information on the approximate time of hearings that were not followed by formal applications, I include these observations in the analysis and consider them as rejections. In the detailed data set on party-level voting behavior, applications that only reached the public hearing phase are not included.

B. Municipality decision

A formal application is then submitted. If the project spans several municipalities, I consider it as separate applications since municipalities have a veto right for turbines within their own border. Municipalities are recommended to announce their decision within three months from when the application was submitted, although this limit is often breached. Parties vote to either approve or reject a pre-defined proposal, although the proposal itself may sometimes include approval of only a subset of the turbines within each application. This can happen if e.g. all parties agree that at least some of the turbines should be approved. In my data, there is only one vote per project and municipality. I can observe if the vote resulted in full approval, partial approval, or rejection. In the descriptive statistics, I code this as a binary variable equal to unity if the application was approved or partly approved (the choice of coding does not matter in the actual comparison between parties, since party votes are binary by default). The veto right was introduced in 2009, so all decisions taken before this year are excluded from the sample.

C. County decision

The application must also pass an evaluation by the county administration (*Miljöprövningsdelegationen*). It evaluates the impact on birds, wildlife, nearby residents, and other potential environmental issues. Before making a final decision, the county will also have to consider the opinion of the military, since wind power sometimes conflicts with military interests. There are 21 county administrations nationwide, but the legislative framework of the environmental code is national. Decisions may vary across turbines within a project, although most projects receive a unified decision. I code this as a binary variable equal to unity if half or more of the turbines are approved.

D. Initial approval decision

The initial decision is then published, where each turbine needs approval from both the municipality and the county. In the complete sample, this is the first level of decision-making that I observe, and I cannot observe if rejections are due to the municipality or county decision. Some applications are withdrawn before an initial decision has been announced (but after the submission of the application). In the complete sample, these projects are recorded as “with-

drawn”. I code these as rejections since the most common reason for the withdrawals is that the applicant has received informal information that the project will be rejected ([Swedish Energy Agency, 2022](#)). In the small data set, I only use information on these applications if I observe party-specific voting behavior before the withdrawal.

E. Appeal and final approval decision. Initial decisions may be appealed to the Land and Environmental Court (*Mark- och miljödomstolen*) by both the investor and other stakeholders. About one-third of all decisions are appealed. There are six such courts across the country. Although less common, it is later also possible to further appeal the decision to the national Land and Environmental Court of Appeal (*Mark- och miljööverdomstolen*). Decisions by these courts are also coded as either rejections or approvals, analogous to the decisions by the county.

2.4 Descriptive statistics of dataset with party-specific voting behavior

The data set was collected by the consulting firm Westander for the Energy Agency by manual inspection of minutes from municipality meetings, and [Mistra Electrification \(2023\)](#) provides a description of the data. The data comprise information about voting behavior, the municipalities’ veto decisions, and subsequent decisions by the county environmental assessment and the environmental courts. Projects with less than three turbines are excluded from the analysis since these are usually smaller, non-commercial projects located close to the residential building of the owner’s property. The data set has 320 observations, and 301 include three or more turbines. Table 1 presents descriptive statistics.

Level of decision-making: The first set of variables describes the level of decision-making within the municipalities for each individual application: council (58%), municipal board (30%), or committee (11%).

Application characteristics: The next variable is the year of the municipality decision, with a mean of 2016. The following variable is the number of turbines in the application, with a mean of 21.

Decision outcomes: The next variable is the municipality veto decision, with a mean approval rate of 76.4 percent, which has declined somewhat over the sample period. The next variable is the county environmental assessment decision, with a mean of 67.6. This variable contains fewer observations than the municipality decision, partly because some applications never reach

this stage, and partly because some decisions were still pending when the data were collected. This variable also declined somewhat during the sample period, indicating that the most suitable locations for wind power have gradually become exploited. The next variable is the decision by the Land and Environmental Court (*Mark- och miljödomstolen*), with a mean of 65.2. Since only appealed decisions reach this court, there are only 164 observations. The last variable is the decision by the Land and Environmental Court of Appeal (*Mark- och miljööverdomstolen*), with a mean of 65.8, and 38 observations.

Table 1: Descriptive statistics of dataset with party-specific voting behavior

	Min	Mean	Max	Sd	Obs
<i>Level of decision-making</i>					
Decision by council	0.0	58.1	100.0	49.4	301
Decision by board	0.0	30.2	100.0	46.0	301
Decision by committee	0.0	11.3	100.0	31.7	301
<i>Application characteristics</i>					
Municipality decision year	2010.0	2015.9	2022.0	2.7	301
Turbines in application (by muni)	3.0	20.8	442.0	39.5	301
<i>Decision outcomes</i>					
Municipal approval	0.0	76.4	100.0	42.5	301
County environmental assessment	0.0	67.6	100.0	46.9	262
Land and Environmental Court decision	0.0	65.2	100.0	47.8	164
Land and Environmental Court of Appeal decision	0.0	65.8	100.0	48.1	38
<i>Approval rate by party</i>					
C	0.0	81.0	100.0	39.3	263
Greens	0.0	76.7	100.0	42.4	163
S	0.0	76.1	100.0	42.7	272
M	0.0	73.9	100.0	44.0	245
V	0.0	66.7	100.0	47.2	219
L	0.0	66.5	100.0	47.3	197
KD	0.0	71.3	100.0	45.4	188
SD	0.0	34.1	100.0	47.5	179

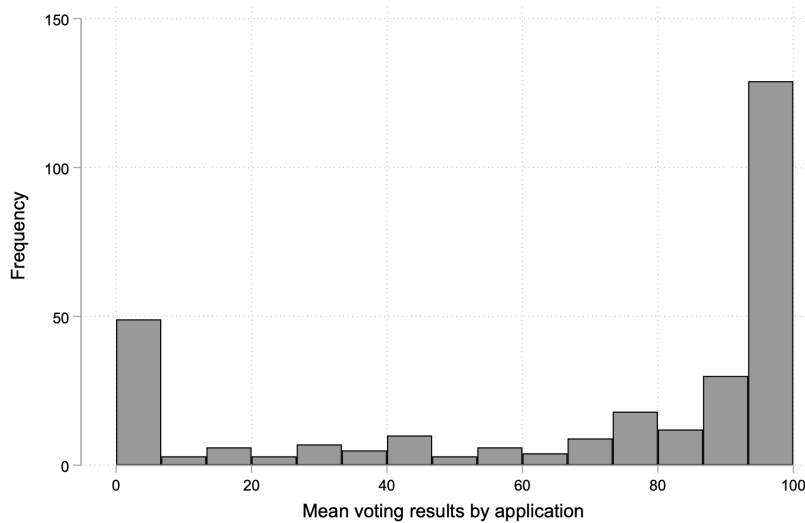
Note: The first three variables are indicators describing the level of decision-making in the municipality, by application. The number of turbines in each application is by municipality, so if one project spans two municipalities, this is coded as two applications.

Approval rate by party: The last set of variables describes party-specific voting behavior, where parties are sorted in descending order according to the share of votes where that party has voted for approval. There is one observation per party and application, even if, at least in theory, individual party members could vote against the main party line. Since not all parties are represented in each council, the number of observations varies between parties. For some observations, party-specific votes are only documented for a subset of parties represented in the council. The Center Party (C) stands out with the highest approval rate, at 81.0. It was initially named the Farmers' Party, and still has strong support among rural landowners. Since

landowners benefit from wind power through e.g. lucrative land leases, the financial benefits associated with wind power likely explain the high approval rate. The Sweden Democrats (SD) stand out with the lowest approval rate, at 34.1. Concordantly, the Sweden Democrats are also most outspokenly critical of wind power. Other parties included are the Social Democrats (S), which is the main left-wing party; the Left Party (V), which is the far-left party; the Christian Democrats (KD), which is the Christian right-wing conservatives; the Moderates (M), which is the main right-wing party; and the Liberals (L), which is also a right-wing party.

Figure 2 depicts the mean percent of approval votes for each individual application, weighted by the number of seats for each party. The distribution is U-shaped, demonstrating that votes are fairly well aligned between parties. The decision is unanimous in 130 of 301 decisions (43 percent). In 100 (31) of these votes, the application was approved (rejected) by the municipality.

Figure 2: Share of approval votes by application



Note: Share of approval votes, by application. Votes are weighted by seat shares in the council for each party.

2.5 Descriptive statistics of data set with complete sample of applications

Application data for the complete sample has been compiled by the author from the publicly available database “*Vindbrukskollen*”, administered by the Energy Agency. These data contain information about the application year, the identity of the owner, initial and final approval decisions (although I cannot observe if rejections are due to the municipal veto), if and when the project was constructed, and a large set of project characteristics including the coordinates of

each turbine (although data on coordinates are less complete for rejected applications). Almost all applications that have ever been submitted are included in this database, although my analysis is limited to applications with three or more turbines where the initial decision was made between 2009 and 2022. Data on ground characteristics and wind speed have been downloaded from the Land survey authority.

Table 2 presents descriptive statistics. The left (right) column contains applications where the initial decision was made in a municipality where voter support for the Greens was above (below) the sample median within the relevant election term. As a complement, Figure 3 maps the location of each application across groups. At least from visual inspection, there is no notable difference across groups regarding the geographic location of the applications.

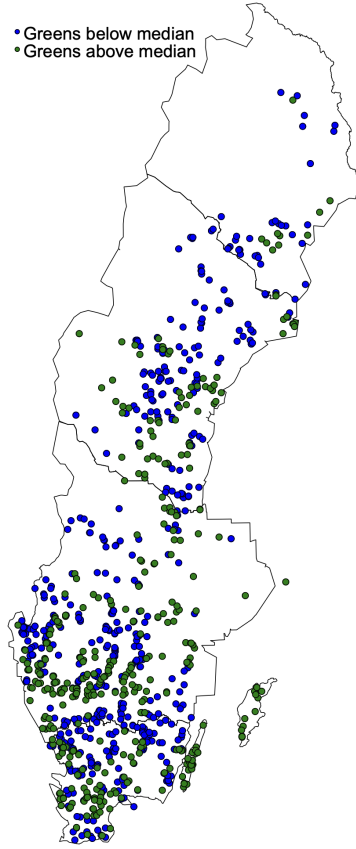
Table 2: Descriptive statistics of data set with complete sample of applications

	<i>Greens below median</i>		<i>Greens above median</i>		<i>below-above</i>
	Mean	Sd	Mean	Sd	
<i>Decision-making characteristics</i>					
Approved (initial decision)	55.2	49.8	49.1	50.0	6.1
Approved (final decision)	46.0	49.9	41.3	49.3	4.7
Built	22.4	41.7	21.9	41.4	0.5
Appealed	38.1	48.6	40.3	49.1	-2.2
<i>Application characteristics</i>					
Nr of turbines	19.7	40.4	12.2	16.2	7.5***
Height	169.6	27.7	167.3	30.0	2.4
Application year	2011.0	2.5	2011.1	2.1	-0.1
<i>Ground characteristics</i>					
Population within 3 km	131.1	378.9	263.3	887.7	-132.2**
Nature reserve	0.0	0.2	0.0	0.2	-0.0
Wind speed at site (m/s)	6.8	0.4	6.9	0.5	-0.1***
Previously approved or built	3.1	3.2	4.5	5.4	-1.4***
<i>Seat share in municipal council</i>					
Greens	1.8	1.3	5.9	1.7	-4.1***
S	38.4	9.1	34.6	7.4	3.8***
V	5.6	4.1	5.1	2.7	0.6*
C	17.6	9.4	12.5	7.0	5.1***
L	4.9	3.7	6.2	3.3	-1.2***
KD	5.2	5.5	4.7	3.3	0.5
M	14.3	7.0	21.8	6.3	-7.5***
SD	5.0	4.6	5.9	4.3	-0.9**
<i>Economic indicators</i>					
Unemployment	7.0	1.7	6.2	1.8	0.8***
GRP per capita	290.3	75.0	309.9	81.2	-19.6***
Observations	433		462		895

* $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Note: Summary statistics for the complete sample of applications. The left (right) column includes applications where the seat share of the Greens was below (above) the sample median at the time of the initial decision. Differences between groups are assessed using a *t-test*.

Figure 3: Locations of applications and Green representation



Note: Geographic locations for applications when voter support for the Greens was above (green) and below (blue) the sample median at the time of decision.

Decision-making characteristics: The main variable of interest is the initial decision, which is lower than the decision-making variables in the previous data set since it requires approval from both the municipality and the county administration. The rightmost column indicates that the initial approval rate is 6.1 percent higher in municipalities where the support for the Greens is below the median, although the difference is statistically insignificant. The mean for the whole sample is 53 percent. The following variables describe the final approval decision, the share of projects that have been built, and the share of appealed applications. Applications that have not yet received a final decision are excluded.

Application characteristics: These variables describe application characteristics, including the number of turbines, mean turbine tip height (usually all turbines are identical), and the year when the application was submitted. Here, only the difference in the number of turbines is

statistically significant, with about 7 more turbines for applications in municipalities where the Greens have lower voter support.

Ground characteristics: These variables describe ground characteristics, including the number of residents within 3 km of the site, if at least one of the turbines is located in a nature reserve, mean wind speed on the site in m/s, and the number of previously built or approved turbines within the municipality. Except for the nature reserve-indicator, differences across groups are statistically significant.

Representation in municipal council: These variables describe the share of seats in the municipal council for all major parties. For almost all parties, there is a statistically significant difference across groups.

Economic indicators: Although there are few local economic benefits of wind power, there may still be some upsides regarding local employment opportunities, leasing rents for landowners, road rehabilitation, and voluntary local compensation schemes. Therefore, I also include data on unemployment share and Gross Regional Product (GRP). Also here, there are statistically significant differences across groups for both variables, although differences are economically insignificant.

3 Method

3.1 Data set on party-specific voting behavior

Baseline specification: My main identification challenge is that all parties are not present in each vote. If, e.g., municipalities where the Greens are present in the municipal council are comparatively less suited for wind power, the approval rate of the Greens may be lower for reasons related to wind power suitability rather than preferences. In my baseline specification, I therefore iteratively perform pairwise comparisons with the Greens and each other party, by only including applications where votes have been recorded for both parties. Differences between parties are assessed using a two proportions Z-test.

Comparing parties in the ruling coalition: Parties that constitute the ruling coalition often negotiate on various political issues, and then vote accordingly in the council. Even if the Greens have stronger preferences for wind power than other parties in the ruling coalition, party dynamics may result in lower approval rates than the Greens would have preferred. To

explore these dynamics, I perform the same test as above but only include applications where both parties are in the ruling coalition.

Comparison of parties when the decision is not unanimous: For an individual party to influence the actual decision in the council, it should ideally be pivotal (abstracting from any negotiations taking place before the actual vote). However, voting patterns are usually similar across parties. Since the Greens hold, on average, the fewest seats, they are pivotal only in less than a handful of all decisions. I therefore compare voting records in votes where the decision is not unanimous, i.e. there is at least some disagreement between parties. This sample corresponds to 57 percent of the decisions. As in the previous specifications, comparisons are pairwise.

Comparison with county- and higher courts' decisions: If the Greens are relatively better at assessing the environmental impact of a project than other parties, the Greens may vote to reject applications that the county administration or the higher courts would reject anyhow. Therefore, I also examine the decisions of these higher bodies conditional on that the Greens have voted to reject the application. I then do the corresponding exercise for the remaining parties. Comparatively few decisions fall under this category, since applications rejected by the council often do not reach the higher bodies. In contrast to the previous tests, results are not based on the same applications across parties, and I do not perform any formal statistical tests of differences in means.

3.2 Complete sample of wind power applications

After establishing the behavior of individual parties, a natural question is whether political representation matters for policy outcomes. One way to examine this would be to regress application outcomes on the share of seats in the municipal council of individual parties. However, since political representation is not random, such a model would require to control of confounding factors. An adequate identification would at least require controlling for municipality-specific time-invariant unobserved confounders. Since the smaller data set contains very few observations per municipality, such an analysis would not be feasible.

So, while the aim of the analysis in the first data set is to examine Green voting behavior, the analysis of the complete sample aims to document the association between the share of Green seats in the council and the actual approval rate, with the added complexity that I cannot observe

if rejections are due to the municipal veto or failure to comply with the environmental standards. To estimate the association between the number of Green seats and the probability of approval, I employ the following model:

$$Y_{lit} = \alpha + \beta_1 Green_{it}^{seats} + \beta_2 Green_{it}^{rule} + \phi \mathbf{X}_{it}^{muni} + \delta \mathbf{X}_{it}^{appl} + \omega_i + \lambda_t + \varepsilon_{lit} \quad (1)$$

Where Y_{lit} is the (binary) outcome of interest for application l in municipality i during election period t . Further, α is a constant, and $Green_{it}^{seats}$ is the share of Green seats in municipality i during election term t , with its associated coefficient β_1 . Correspondingly, the indicator variable $Green_{it}^{rule}$ equals unity if the Greens are in the ruling coalition.

Further, I include $\mathbf{X}_{it}^{muni}$, which is a set of time-varying municipality-specific control variables with its associated coefficient vector ϕ , which e.g. includes the seat shares of all other major parties. Further, $\mathbf{X}_{it}^{appl}$ is a vector of applications-specific variables with its associated coefficient vector δ . Last, ω_i and λ_t are municipality- and election period fixed effects, and ε_{lit} is the error term that is clustered within municipalities.

Since the outcome variable is binary, a logit model should in principle be appropriate. However, since most municipalities only receive at most two or three applications, including fixed effects may lead to overfitting and a high sensitivity to model specification. Therefore, as a robustness test I also estimate the model using OLS.

Since the municipalities' decisions are usually announced early in the approval process, the main dependent variable is the initial decision. As a robustness test, I also estimate the model using the final decision, since the municipality may still change its mind and exercise the veto later in the approval process. At least in theory, there is also a possibility that individual parties attempt to influence the decisions by the county or the courts, although I am unaware of any anecdotal evidence of such attempts.

Although my model captures the conditional association between the number of green seats and the probability of approval, $\hat{\beta}_1$ should not be interpreted strictly causally, since there may exist a correlation between the share of Green seats and wind power suitability that is not captured by the observables. As discussed briefly in the introduction, this may e.g. be due to simultaneity bias if voter behavior is affected by the anticipation of future wind power applications. It is

also possible that developers choose the locational decisions of their applications based on the political constitution of the council. For example, if developers believe that the Greens are more likely to accept wind power than other parties, the quality of applications submitted to “Green” municipalities could be lower than elsewhere in a way that is not captured by the observables. The political economics literature also discusses other, more general, sources of endogeneity when identifying the effect of political representation. For example, voters may affect policymaking directly, regardless of the behavior of their elected representatives. In the present context, this could happen if e.g. Green voters attend public hearings about wind power projects, and express their views in a way that affects decision-making. Regardless of the exact mechanisms behind the statistical association identified by the regression analysis, the main takeaway of the regression analysis is to highlight the statistical association between Green representation and the probability of wind power approval, rather than to precisely identify the causal effect. For a general discussion on identification issues when estimating the causal effect of party representation in proportional representation systems, see [Folke \(2014\)](#).

4 Results

4.1 Data set on party-specific voting behavior

Table 3 presents the results from the first three specifications, where comparison parties are sorted in descending order according to the parties’ approval rate in the baseline specification.

Results from the baseline specification are in the top rows. The Center party (C) stands out with the highest relative approval rate, with a mean of 85.0, which is 8.5 percent higher than the Greens at 76.5. Further, both the Social Democrats (S) and the Moderates (M) have higher approval rates than the Greens, with 3.2 and 0.7 percent higher rates, respectively. However, none of the differences are statistically significant, suggesting that the voting behavior of the Greens is in fact not different from the remaining three major parties, that together average a 70 percent vote share. In comparison to the remaining parties, the Greens have a higher approval rate, and for L and SD, the difference is in fact statistically significant. As expected, the difference is most attenuated for SD, at -37.7 percent.

The following rows present results when the Greens and the comparison party are both in the rul-

ing coalition. Due to the smaller number of observations, none of the differences are statistically different. However, both the Center Party and the Moderates now have economically significantly higher approval rates, at 16 and 12 percent, and there is no difference in approval rates compared to the Social Democrats or the Left Party. Compared to the remaining parties, the Greens have higher approval rates, in line with the results from the baseline specification.

Results from the specification where the decision is divided are in the last rows. Both absolute differences and the ranking of parties are almost identical to the baseline specification, although somewhat accentuated both with regard to magnitude and statistical precision. For example, the difference compared to the Center party is now 13.7 percent and significant on the ten percent level.

Results from the last specification are in Table 4. Parties are sorted in ascending order according to the approval rate of the county administration. If the probability that the county or courts reject is relatively high following a rejection vote by the Greens, figures should be lower than for the remaining parties. However, the lowest figure is attained for the Social Democrats, where the county only approved 12 percent of the applications that the Social Democrats voted to reject. The remaining figures give no support to the hypothesis that rejections by the Greens are more aligned with rejections by the higher bodies than the remaining parties. However, as discussed above, results should be interpreted with care, both since these figures are computed using different sets of applications for each party, and since there are relatively few observations.

Table 3: Results using data on party-specific voting behavior

	<i>Comparison party</i>			<i>Greens</i>		<i>Comp-Greens</i>
	Obs	Mean	Sd	Mean	Sd	Mean
<i>Baseline specification</i>						
C	153	85.0	35.9	76.5	42.6	8.5
S	156	80.8	39.5	77.6	41.9	3.2
M	150	76.0	42.9	75.3	43.3	0.7
V	131	73.3	44.4	75.6	43.1	-2.3
KD	123	73.2	44.5	76.4	42.6	-3.3
L	135	62.2	48.7	79.3	40.7	-17.0**
SD	106	34.9	47.9	72.6	44.8	-37.7***
<i>Both in rule</i>						
C	25	84.0	37.4	68.0	47.6	16.0
S	47	83.0	38.0	83.0	38.0	0.0
M	25	76.0	43.6	64.0	49.0	12.0
V	35	82.9	38.2	82.9	38.2	0.0
KD	21	57.1	50.7	66.7	48.3	-9.5
L	23	56.5	50.7	69.6	47.0	-13.0
<i>Not unanimous</i>						
C	95	87.4	33.4	73.7	44.3	13.7*
S	94	81.9	38.7	76.6	42.6	5.3
M	89	74.2	44.0	73.0	44.6	1.1
V	88	70.5	45.9	73.9	44.2	-3.4
KD	82	70.7	45.8	75.6	43.2	-4.9
L	84	50.0	50.3	77.4	42.1	-27.4***
SD	79	21.5	41.4	70.9	45.7	-49.4***

* $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Note: Comparison of approval rates in the municipal council by the Greens and other major parties. In the baseline specifications, comparisons are based on applications where voting records exist for both parties. “Both in rule” is a subset of the applications in the baseline specification where both the Greens and the comparison party are in the ruling coalition. “Not unanimous” is a subset of the applications in the baseline specification containing votes that were not unanimous. Parties are sorted in descending order according to their mean approval rate in the baseline specification. Differences between parties are assessed using a two proportions Z-test.

Table 4: Party rejection vs. decision by higher bodies

	<i>County</i>		<i>Environmental Court</i>		<i>Environmental Court of Appeal</i>	
	Mean	Obs	Mean	Obs	Mean	Obs
S	12.0	25	40.0	5	0.0	2
V	28.3	46	42.9	14	60.0	5
C	33.3	21	80.0	5	33.3	3
M	38.1	21	50.0	8	.	0
KD	41.7	24	71.4	7	100.0	4
Greens	43.5	23	54.5	11	.	0
SD	52.1	73	61.5	39	71.4	7
L	52.6	38	72.2	18	66.7	3

Decisions by the County environmental assessment, the Land and Environmental Court, and the Land and Environmental Court of Appeal, conditional on that the party voted for rejection. Parties are sorted in ascending order according to the approval rate of the County environmental assessment. A low figure indicates that party rejections are aligned with rejections by the higher decision-making bodies.

4.2 Results from complete sample of applications

Results from estimating equation (1) are presented in Table 5, with the initial approval decision as the dependent variable. Odds ratios are displayed instead of coefficients, meaning that a value below unity indicates a negative association between the independent variable and the probability of approval. For the main variable of interest, “Greens seat share”, the marginal effect is also presented below the main results, evaluated at the sample mean of all variables. This is the percentage point change in the probability of approval when the seat share of the Greens increases by one percentage point.

In column (1), no controls or fixed effects are included. Specification (2) introduces a dummy variable indicating if the Greens are in the ruling coalition, and in (3), election period fixed effects are included. Column (4) also controls for the seat shares of all other major parties (here, the dummy variable indicating if the Greens are in the ruling coalition is removed, so that variables reflecting political representation are symmetric across parties). The preferred specification is (5), in which also ground characteristics is included as controls. None of the coefficients representing Green representation are now statistically significant, in line with the results from the main analysis in Section 4.1.

Table 5: Logit estimation with initial approval decision as the dependent variable.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Representation in municipal council</i>						
Greens seat share ($\hat{\beta}_1$)	0.90*** (0.030)	0.91*** (0.030)	0.90*** (0.032)	0.90** (0.043)	0.93 (0.047)	0.84 (0.14)
Greens in rule ($\hat{\beta}_2$)		0.93 (0.17)	0.91 (0.17)		0.89 (0.19)	0.77 (0.34)
M seat share				0.99 (0.016)	1.02 (0.020)	0.94 (0.073)
S seat share				1.00 (0.016)	1.01 (0.019)	0.98 (0.051)
V seat share				1.05* (0.031)	1.05 (0.040)	1.17 (0.18)
KD seat share				0.95*** (0.019)	0.95** (0.024)	0.88 (0.14)
C seat share				0.97* (0.015)	0.98 (0.019)	0.92 (0.065)
L seat share				0.96 (0.029)	0.93** (0.031)	0.83 (0.15)
SD seat share				0.93*** (0.026)	0.97 (0.035)	1.06 (0.13)
<i>Application characteristics</i>						
Turbines					1.29 (0.20)	1.72** (0.43)
Height					0.97*** (0.0041)	0.96*** (0.0084)
<i>Ground characteristics</i>						
Population within 3 km					0.82*** (0.056)	0.99 (0.14)
Nature reserve					0.51 (0.30)	0.53 (0.48)
Wind speed at site (m/s)					0.54** (0.16)	0.82 (0.62)
Previously approved or built					0.99 (0.019)	0.53*** (0.091)
<i>Economic indicators</i>						
Unemployment					0.99 (0.067)	1.02 (0.27)
GRP per capita					1.00 (0.0015)	1.02* (0.012)
<i>Greens seat share, marginal effect</i>	-2.50	-2.40	-2.50	-2.30	-1.50	-2.90
Time FE	No	No	Yes	Yes	Yes	Yes
Muni FE	No	No	No	No	No	Yes
GP share of seats FE	894	894	894	894	710	507

* p < .10, ** p < 0.05, *** p < 0.01

Note: Logit estimation based on equation (1). Standard errors (in parentheses) are clustered by municipality. Marginal effects are computed based on the mean value of all variables. Odds ratios are displayed instead of coefficients.

In sum, results suggest that the data are too imprecise to infer any association between political representation and the probability of approval. One interpretation is that political representation does in fact not matter for the probability of approval.

Table A1 presents the corresponding estimates for the final approval decision, which only affects coefficients trivially. Further, OLS results using the initial and final decision as outcome variables, respectively, are presented in Table A2 and A3. These coefficients are largely in line with the corresponding marginal effects from the logit specifications, both in terms of magnitude and precision.

5 Concluding discussion

By examining municipality voting records from 300 wind power applications, I do not find any statistically significant difference in the probability of approval. I find that the Greens are slightly less inclined to vote for approval than the three major parties in local politics, which together hold about 70 percent of the seats in the municipal councils. A likely mechanism is that even if the Greens have stronger preferences for climate policy, they are also relatively more concerned about the associated local environmental disamenities. Another contributing reason could be the relatively strong preference for participatory democracy within the Greens, which could render local opposition more influential in local decision-making.

Consistent with the observation from the voting records, I examine less detailed data from 900 applications, finding that a percentage increase of Green seats in the municipal council is associated with a reduction in the probability of approval by 1-3 percentage points, from a mean approval rate of 53 percent.

Since coefficients from both data sets are imprecisely estimated, results should be interpreted with great care. Nonetheless, given that the Greens have a very strong focus on the expansion of wind power within the national political discourse, the main takeaway of this study is to demonstrate that none of the data supports the hypothesis that the Greens are more positive towards wind power when it comes to actual municipality-level decision-making for individual applications.

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Appendix A: Additional tables and figures

Table A1: Logit estimation with final approval decision as the dependent variable.

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Representation in municipal council</i>						
Greens seat share ($\hat{\beta}_1$)	0.92*** (0.029)	0.93** (0.030)	0.92** (0.031)	0.94 (0.038)	0.96 (0.041)	0.96 (0.12)
Greens in rule ($\hat{\beta}_2$)		0.86 (0.15)	0.85 (0.15)		0.85 (0.17)	0.55 (0.20)
M seat share				0.99 (0.016)	1.00 (0.019)	0.96 (0.072)
S seat share				1.01 (0.014)	1.02 (0.016)	1.01 (0.043)
V seat share				1.06** (0.031)	1.07** (0.036)	1.14 (0.13)
KD seat share				0.97* (0.018)	0.98 (0.020)	0.77** (0.090)
C seat share				0.98 (0.014)	0.99 (0.018)	0.96 (0.051)
L seat share				0.96 (0.029)	0.94* (0.030)	0.94 (0.13)
SD seat share				0.97 (0.024)	1.01 (0.032)	1.17 (0.13)
<i>Application characteristics</i>						
Turbines					1.36** (0.17)	1.57** (0.30)
Height					0.98*** (0.0038)	0.97*** (0.0072)
<i>Ground characteristics</i>						
Population within 3 km					0.85*** (0.051)	0.92 (0.11)
Nature reserve					0.33** (0.17)	0.40 (0.25)
Wind speed at site (m/s)					0.92 (0.25)	1.89 (1.00)
Previously approved or built					0.99 (0.016)	0.88 (0.10)
<i>Economic indicators</i>						
Unemployment					0.98 (0.064)	1.16 (0.22)
GRP per capita					1.00 (0.0015)	1.00 (0.011)
<i>Greens seat share, marginal effect</i>	-2.10	-1.90	-1.90	-1.50	-0.80	-0.80
Time FE	No	No	Yes	Yes	Yes	Yes
Muni FE	No	No	No	No	No	Yes
GP share of seats FE	893	893	893	893	709	521

* $p < .10$, ** $p < 0.05$, *** $p < 0.01$

Note: Logit estimation based on equation (1) with the final decision as the dependent variable. Standard errors (in parentheses) are clustered by municipality. Marginal effects are computed based on the mean value of all variables. Odds ratios are displayed instead of coefficients.

Table A2: OLS estimation with initial approval decision as the dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Representation in municipal council</i>						
Greens seat share ($\hat{\beta}_1$)	-0.025*** (0.0079)	-0.024*** (0.0080)	-0.025*** (0.0085)	-0.023** (0.011)	-0.015 (0.010)	-0.031 (0.028)
Greens in rule ($\hat{\beta}_2$)		-0.017 (0.045)	-0.022 (0.045)			
M seat share				-0.0023 (0.0036)	0.0037 (0.0039)	-0.0043 (0.012)
S seat share				-0.00051 (0.0035)	0.0028 (0.0037)	-0.0032 (0.0078)
V seat share				0.0100* (0.0057)	0.0071 (0.0063)	0.017 (0.017)
KD seat share				-0.012*** (0.0040)	-0.0097** (0.0045)	-0.021 (0.023)
C seat share				-0.0064** (0.0032)	-0.0031 (0.0037)	-0.0086 (0.010)
L seat share				-0.010 (0.0069)	-0.014** (0.0071)	-0.0031 (0.024)
SD seat share				-0.017*** (0.0062)	-0.0072 (0.0076)	0.011 (0.017)
<i>Application characteristics</i>						
Turbines					0.048 (0.030)	0.064* (0.037)
Height					-0.0054*** (0.00068)	-0.0052*** (0.0012)
<i>Ground characteristics</i>						
Population within 3 km					-0.042*** (0.014)	-0.0056 (0.023)
Nature reserve					-0.15 (0.11)	-0.13 (0.16)
Wind speed at site (m/s)					-0.11** (0.057)	-0.020 (0.11)
Previously approved or built					-0.0022 (0.0043)	-0.080*** (0.019)
<i>Economic indicators</i>						
Unemployment					-0.0019 (0.014)	-0.0092 (0.037)
GRP per capita					0.00038 (0.00029)	0.0024 (0.0015)
Time FE	No	No	Yes	Yes	Yes	Yes
Muni FE	No	No	No	No	No	Yes
N	894	894	894	894	710	710

* p < .10, ** p < 0.05, *** p < 0.01

Note: OLS estimation based on equation (1) with the initial decision as the dependent variable. Standard errors (in parentheses) are clustered by municipality.

Table A3: OLS estimation with final approval decision as the dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Representation in municipal council</i>						
Greens seat share ($\hat{\beta}_1$)	-0.021*** (0.0075)	-0.019** (0.0076)	-0.019** (0.0079)	-0.015 (0.0092)	-0.0088 (0.0089)	-0.015 (0.023)
Greens in rule ($\hat{\beta}_2$)		-0.036 (0.042)	-0.040 (0.041)			
M seat share				-0.0032 (0.0037)	0.00047 (0.0041)	-0.0058 (0.015)
S seat share				0.0014 (0.0031)	0.0041 (0.0035)	0.0036 (0.0074)
V seat share				0.012** (0.0059)	0.013** (0.0058)	0.016 (0.023)
KD seat share				-0.0077** (0.0038)	-0.0043 (0.0042)	-0.037* (0.021)
C seat share				-0.0045 (0.0033)	-0.0018 (0.0038)	-0.0063 (0.010)
L seat share				-0.0089 (0.0066)	-0.012* (0.0066)	-0.0068 (0.022)
SD seat share				-0.0064 (0.0056)	0.0013 (0.0069)	0.024 (0.017)
<i>Application characteristics</i>						
Turbines					0.064** (0.026)	0.060* (0.034)
Height					-0.0041*** (0.00075)	-0.0042*** (0.0011)
<i>Ground characteristics</i>						
Population within 3 km					-0.038*** (0.013)	-0.014 (0.023)
Nature reserve					-0.23** (0.092)	-0.16 (0.11)
Wind speed at site (m/s)					-0.017 (0.060)	0.099 (0.11)
Previously approved or built					-0.0024 (0.0034)	-0.020 (0.019)
<i>Economic indicators</i>						
Unemployment					-0.0053 (0.014)	0.020 (0.036)
GRP per capita					0.00039 (0.00031)	0.00032 (0.0017)
Time FE	No	No	Yes	Yes	Yes	Yes
Muni FE	No	No	No	No	No	Yes
N	893	893	893	893	709	709

* p < .10, ** p < 0.05, *** p < 0.01

Note: OLS estimation based on equation (1) with the final decision as the dependent variable. Standard errors (in parentheses) are clustered by municipality.