

Is There Evidence that Legislative Ambition Matches Development? Evaluating the Factors Influencing Wind Energy Development

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Introduction

Since the mid-1990s, states and foreign governments have been considering, and passing, legislation that requires a minimum percentage of energy production to be from renewable energy sources (e.g. wind, solar, geothermal, tidal, and biomass). In 2009 the United States Senate Committee on Energy and Natural Resources suggested that a federal standard be implemented, while nearly every state has already adopted their own standards independently. Coinciding with the passage of the many state level alternative and renewable energy portfolio standards, there has been a noticeable increase in the development of wind farms to meet growing energy needs and provide a renewable source of power generation. In fact, many state energy portfolios mandate specific mixes of renewable energy requiring the use of wind energy. In this paper, we evaluate the relationship between the adoption of alternative (and renewable) energy portfolio standards to electric utilities' development of new wind farms, while simultaneously evaluating the important factors in firms' location decisions for new wind projects.

Objective

- establish the relationship between the adoption of state level renewable energy portfolio standards and actual wind farm development
- evaluate the factors that influence the decision of a firm to locate a wind farm in a particular location
- establish a foundation for future research and to help inform policy

Wind Farms and Wind Suitability



Results

Perfect State (logistic)

Variable	Coefficient	SE	P > Z
RPS_Standard	0.0415	0.0118	0.000
dum_RPS_Vol	0.8713	0.5666	0.124
dum_RPS_Wind	-0.7013	0.2474	0.005
elec_pct_2004	-0.1317	0.1833	0.473
elec_cap_2007	-0.2075	0.0433	0.000
total_elec	-0.0009	0.0002	0.000
acre_value	0.0001	0.0000	0.000
cntyPop_2007	0.0000	0.0000	0.000
_IERegion_2	2.5440	0.5318	0.000
_IERegion_3	0.1361	0.6892	0.844
_IERegion_4	1.4581	0.3955	0.000
_IERegion_5	2.6173	0.4424	0.000
_IERegion_6	2.5951	0.4582	0.000
cons	2.7507	0.5177	0.000

Imperfect State (Poisson)

Variable	Coefficient	SE	P > Z
cntyPop_2007	-1.390E-07	1.950E-08	0.000
acre_value	-2.430E-05	2.830E-06	0.000
catt_tot	1.070E-05	1.900E-07	0.000
irr_share	-1.233E+00	4.632E-02	0.000
wind3	1.209E-01	5.573E-02	0.030
wind4	4.940E-02	4.323E-02	0.253
wind5	1.150E+00	4.966E-02	0.000
wind6	-3.662E-01	3.462E-02	0.000
dt_state_2	-2.637E+00	7.392E-01	0.000
dt_state_3	6.622E-01	5.508E-02	0.000
dt_state_4	-2.004E-01	6.139E-02	0.001
dt_state_5	-2.739E-01	1.190E-01	0.021
dt_state_6	4.335E-02	6.966E-02	0.534
dt_state_9	-1.695E+00	1.108E-01	0.000
dt_state_10	-1.075E+00	7.613E-02	0.000
dt_state_11	-9.320E-01	9.215E-02	0.000
dt_state_12	-4.808E-01	8.424E-02	0.000
dt_state_14	-6.786E-01	8.399E-02	0.000
dt_state_15	-2.698E-01	6.449E-02	0.000
dt_state_16	-1.059E+00	8.848E-02	0.000
dt_state_17	9.572E-01	6.191E-02	0.000
dt_state_18	-1.754E+00	3.249E-01	0.000
dt_state_19	-4.985E-02	6.316E-02	0.430
cons	3.073E+00	7.325E-02	0.000

Wind Farms and Electricity Transmission Capacity



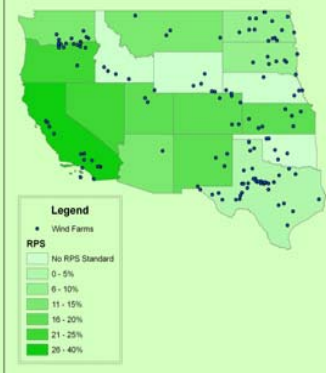
Conclusions

- the existence of a state mandated portfolio standard does not increase the likelihood of wind farm development, especially if standards are voluntary
 - portfolio standards that explicitly mandate wind, however, do increase the likelihood
- the existence of transmission infrastructure increases the likelihood of development
- higher land values and more prevalent irrigated agriculture associated with lower intensity of development
- prevalence of cattle in a county associated with a greater intensity of development
- existence of wind powerclass ratings of 3, 4, or 5 associated with more development, while a WPC greater than 5 indicates less development

Future Research

- Investigate the possible capitalization of transmission line development into land values as a result of mandated renewable portfolio standards

Wind Farms and State Renewable Energy Portfolio Standards



Methods

- restrict the study area to states within the power markets of CAISO, Northwest, SPP, Southwest, and ERCOT
- individual producer chooses a particular county for development of a wind farm
- implement a zero-inflated Poisson (ZIP) regression to deal with the excess zeros in our count data
- control for state fixed effects