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Shades of Green: Modelling Differences in Thought and Action among Electric Utility Regime Actors in the Energy System Transition

Bonnie Wylie Pratt [1,2,*], Jon D. Erickson [1,2], Jane Kolodinsky [2,3], Erik Monsen [4] and William J. Wales [5]

1 Rubenstein School of Environment and Natural Resources, University of Vermont, Burlington, VT 05405, USA
2 Gund Institute for Environment, University of Vermont, Burlington, VT 05405, USA
3 Department of Community Development and Applied Economics, University of Vermont, Burlington, VT 05405, USA
4 Grossman School of Business, University of Vermont, Burlington, VT 05405, USA
5 Department of Management, School of Business, University of Albany, SUNY, Albany, NY 12222, USA
* Correspondence: bonniepinvt@gmail.com

Abstract: There is wide variability in how organizations approach sustainability and the energy system transition toward using more renewables. In the electric power industry, while some distribution utilities have leaned into the transition, others have taken a more conservative approach. Grounded in an institutional resource-based perspective, this multi-level study examines key intra-firm, firm, and individual leadership factors that impact an organization's commitment to renewables. Sustainability orientation in the power industry is assessed as the percent of renewable energy in a utility's fuel mix compared with their expressed commitment to renewables and energy efficiency within planning documents. Through computer-aided text analysis, characteristics of 170 electric utilities in the United States were analyzed to predict sustainability orientation. Results indicate that rurality, deregulation, and the entrepreneurial orientation of a utility, as expressed within their Integrated Resource Plans, explain a significant amount of variability in the sustainability orientation of electric utilities.

Keywords: energy system transition; entrepreneurial orientation; renewable energy; sustainability orientation

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1. Introduction

The electric power industry is in upheaval, as user preferences change, generation loses predictability, and the electrification of industries like transportation and agriculture are poised to exert pressure on an already stressed regime. Organizational performance measures have expanded from a singular focus on providing reliable, least cost power to now include meeting policy goals for larger renewable energy shares. Some utilities are taking a defensive stance and resisting decarbonization, while others lean into a future based on a decentralized, decarbonized, and digitized grid. Why do some electric utilities lean into the transition from fossil fuels to renewable energy while others resist change?

Considering the multi-level perspective on socio-technical transitions developed by Geels [1] and applied to deep decarbonization of energy systems [2], this research offers a new approach to investigating regime-level change in the context of market, organizational, and managerial factors that influence how electric utilities approach the energy system transition. Geels suggests that sociotechnical transitions occur when forces from the niche level and sociocultural level apply pressure to the existing regime, finally succeeding in altering the structures, processes, and policies that kept that regime in place. However, sociotechnical change does not occur at the same rate for all regime actors. Drawing on Oliver's resource-based institutional theory [3], we propose a heterogeneity in the behavior of regime actors related to inter-firm, firm, and individual leadership factors.

Central to this approach is estimating "entrepreneurship orientation" from computer-aided text analysis [4]. Investigations of entrepreneurial orientation are concerned with the decision-making practices, managerial philosophies, and strategic behaviors of a firm [5,6] In the context of the renewable energy transition, a "sustainability orientation" score was developed using Integrated Resource Plans (IRPs) for 170 electric utilities in the United States. These publicly available strategic plans provide a window into utility planning and prioritization that can then be compared to niche-level and landscape-level pressures on the socio-technical regime. Since there are considerable time lags to designing and building new energy generation and transmission infrastructure, textual analysis of IRPs can provide insight into how a utility is positioned to meet, exceed, or resist the transition to renewable energy.

The study begins with developing hypotheses around contributing factors to the sustainability orientation (SO) score of electric utilities. Following Oliver [3], SO drivers are organized into three different levels of inquiry that could impact organizational posture: inter-firm, firm, and individual. At the inter-firm level, public and regulatory pressures can have a profound impact on business decisions [7,8]. For example, state rurality, market dynamism, and renewable portfolio standards (RPS) can potentially impact a utility's engagement with the transition to renewables. Firm level variables including size, age, and ownership structure may also influence an organization's decision-making processes and strategic orientation [9,10]. While many organizations have been established for decades in uncontested marketplaces, newer entities such as community choice aggregators are creating competitive markets that can use environmental consciousness as a strategy to attract customers [11]. Lastly, at the individual leadership level, factors such as the CEO's experience in the power industry or gender may also play an important role in influencing a utility's environmental consciousness and sustainability orientation. For example, recent studies suggest that women may be more likely to invest in clean energy technologies than men when in corporate leadership positions [12].

Following hypothesis development, the paper provides more detail on methodology, including the novel SO approach developed from a new CATA dictionary based on the combined glossaries of the American Council for an Energy Efficiency Economy [13] and Clean Energy Resource Teams [14]. A results section then details the six models developed to evaluate influences on SO scores and the percentage of power from renewables. The paper concludes with the implications of this research for policy makers interested in accelerating utility efforts to decarbonize. The main contribution of this paper is a deeper understanding of the drivers of change among regime actors in the energy system transition.

2. Hypothesis Development

Sustainability orientation (SO) has been framed and measured in many ways. Perhaps the most holistic was proposed by Roxas et al. [15] as a three-dimensional scale assessing an organization's knowledge, practice, and commitment to sustainability. This approach is followed by analyzing the performance of family versus non-family firms, new ventures, and stakeholder integration among others [16–18]. Other researchers have viewed SO as a combination of economic, social, and environmental priorities in a triple-bottom-line business strategy [19–23]. Others follow a narrower model of "ecopreneurship", aligning environmental priorities with the core business model [24].

The narrower interpretation of SO as commitment to renewables and efficiency makes sense within the context of the power industry. Electric utilities are unique among organizations, in that the selection of core resources within their strategic orientation directly reflects their commitment to environmental values. Following Oliver [3], SO can then be evaluated across a suite of factors at the inter-firm, firm, and individual levels. Oliver's institutional framework is particularly well-suited to an analysis of sustainability in the power industry, due to profound differences in the institutional context of utilities.

Beginning with the inter-firm environment, in a highly regulated industry like the U.S. power industry, policies can vary substantively by from state to state. In the context of this study, some states require renewables to represent a certain percentage of a utility's fuel mix, while others make no such demands. In addition to variations in policy design between states, demographic disparities, such as the rurality of a state, may also impact a utility's positioning towards renewables. Due to the regulated nature of the industry, there are also discrete differences in firm culture across electric utilities. In the power industry, utilities are structured in one of three ways: investor-owned, municipally owned, or cooperative. This ownership structure may determine how involved customers are in decisions about their electric system. Rural cooperatives and municipal utilities typically serve a single city and decisions about siting and fuel mix are informed at least in part by community engagement [25]. Investor-owned utilities, however, tend to be much larger and potentially more sensitive to outside investor priorities in resource acquisition decisions. In addition to ownership structure, other firm-level factors that may influence SO include organization age and institutional conformity.

At the individual leadership level, the characteristics of top executives can have a profound impact on the trajectory of an organization [26]. For example, the gender and tenure of the CEO might influence positioning toward renewables. The traditionally masculine power industry is just beginning to open up leadership positions to women [27]. Prior research suggests that female led organizations are more innovative and likely to champion environmental action in the workplace [28,29]. There is also a growing literature on the influence of gender on entrepreneurial orientation [30–32]. CEO tenure can also impact the level of SO that an organization expresses. For example, research on family organizations has found that, after about 15 years, a CEO begins to display less entrepreneurial orientation, an effect that occurs at a faster rate in non-family organizations like electric utilities [33]. Prior researchers have applied institutional theory to suggest that increased exposure to institutional norms will make a CEO more likely to exhibit isomorphism, and be less willing to innovate after a mid-point in their career [34,35].

Figure 1 illustrates how we approached this analysis of heterogeneity in the power industry. We selected eight sets of hypotheses across all three of Oliver's levels in order to build a model of sustainability orientation. This is a classic example of a moderator model where predictors, moderators, and predictors crossed with moderators, all comprise discrete hypotheses [36].

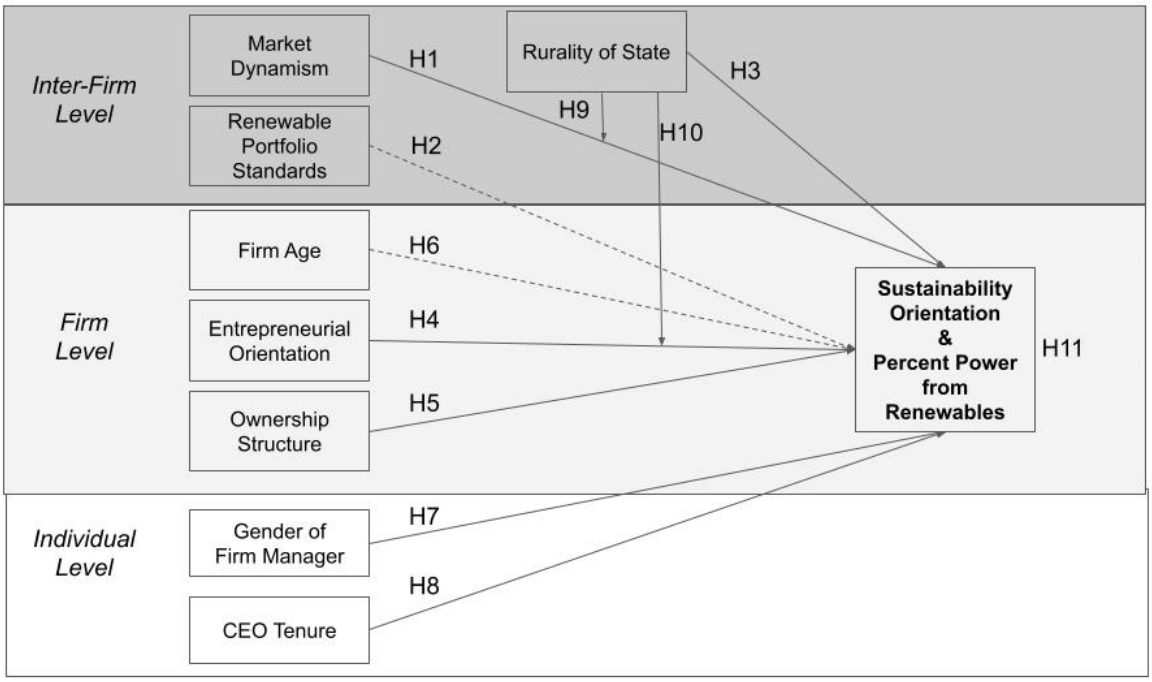

Figure 1. Conceptual framework.

2.1. Inter-Firm Level

Market Dynamism. Market turbulence has been positively associated with entrepreneurial orientation in previous studies [7]. In the power industry, there is a recent trend of deregulation where utilities are able to compete for customers for the first time, increasing market dynamism. In regulated states, consumers have no choice in their distribution utility, while in deregulated states consumers choose their energy provider. In the competitive environment of a deregulated state, we predicted that utilities would seek to use renewables as a form of competitive advantage. As a result, we hypothesized that environmental dynamism would be highly correlated with SO and percent power from renewables.

H1a: *Market dynamism will make it more likely for utilities to talk about renewables*.

H1b: *Market dynamism will increase the likelihood that a utility sources energy from renewables*.

Renewable Portfolio Standard (RPS). These state-level policies require utilities to source a certain percentage of their overall fuel mix from renewables. These standards can be required, recommended, or non-existent depending on the state where the utility functions. Previous studies have found that RPS are effective at increasing the percentage of power that a utility derives from solar [8]. We predicted that RPS would similarly be positively correlated to the overall percentage of power that a utility derives from renewables. However, we did not believe that this policy would have a direct impact on SO.

H2: *Renewable portfolio standards will increase the likelihood that a utility sources energy from renewables*.

Rurality. Rurality is important to consider in any study of renewable energy. The promise of renewable energy and the reality of its implementation in rural America today, points to potential equity concerns. Previous literature has found that rural states are more likely to derive power from renewables, but issues like the placement and ownership of infrastructure often lead to conflict and resistance from rural communities [37–39]. Alternatively, goals of self-reliance and economic growth could be assisted through the increased penetration of renewables. Rural communities have also demonstrated higher levels of social cohesion, trust, and embeddedness which make them particularly well positioned to support community renewable energy initiatives and rural social entrepreneurs [40]. Renewable energy also has the potential to support rural identities, like self-reliance and independence, by creating options for customers to isolate themselves from issues related to the larger grid [41]. Further, the development of renewables is often considered a key strategy for helping rural communities enliven job markets [42].

In practice, renewable energy installations are often not delivering on their promise. High numbers of permanent, long-term jobs are not usually created when large private corporations install wind turbines in rural areas [43]. Additional research suggests that the economic promise of a more vibrant economy is rarely fulfilled when renewable energy projects are privately owned [44]. While wind energy is the most likely to create conflict, bioenergy and geothermal have also been problematic [39,45,46]. Rural energy transitions are frequently hotly contested, so we hypothesized that utilities in rural states might be less inclined to show high levels of support for renewables. In contrast, we also hypothesized that renewables would be more prevalent in rural states, and thus, rurality would be positively correlated with the percent of power from renewables.

H3a: *Rural communities will be less likely to talk about renewables*.

H3b: *Rural utilities will be more likely to source power from renewables*.

2.2. Firm Level

Entrepreneurial Orientation (EO). We measured each utility's proactiveness, innovativeness, and risk-taking preferences by analyzing the language that utilities included in their IRPs. Previous research has connected EO to different expressions of organization performance, such as profitability and an increase in sales [47–49]. EO has also been correlated to non-financial performance metrics, such as forming strategic partnerships, keeping talented employees, increasing employee motivation, and creating a positive culture [50,51]. Research in information studies has posited that utilities with a culture of innovation will be more likely to be early adopters of renewable energy technologies, although there is limited research to date on technology adoption decisions in regulated industries like the power industry [52]. This research explores the relationship between EO and utility commitment to renewables, hypothesizing that entrepreneurial utilities will be more likely to derive energy from renewables and talk about renewables in their planning documents.

H4a: *Entrepreneurial orientation should be associated with a focus on decarbonization in utility planning documents.*

H4b: *Entrepreneurial orientation should be associated with the percent of power from renewables in a utility's fuel mix.*

Organization Ownership Structure. Elements of utility performance, such as cost and higher service quality, have been associated with public ownership in previous studies [53,54]. However, there has not been any research on how utility ownership structure correlates to commitment to renewables. Of the three main types of utility ownership, investor-owned utilities (IOUs) are the only privately owned, and with far larger service territories. In 2017, 168 IOUs provided power to 72% of U.S. electricity consumers [55]. Since privately owned utilities are larger and controlled by board members, rather than local residents, we hypothesized a prioritization of profits over community goals would manifest as both less power from renewables on average and a lower frequency of language regarding renewables and efficiency in their IRPs.

H5a: *Privately owned utilities will be less likely to talk about renewables than publicly owned utilities.*

H5b: *Larger/privately owned organizations will be less likely to get power from renewables.*

Organization Age. Prior research has found that older organizations are less likely to convert entrepreneurial orientation into higher performance metrics [10,56]. We predicted that older utilities would be more set in their ways, and less inclined to talk about renewables and efficiency in their planning documents. We did not investigate the link between organization age and fuel mix because installing new generation facilities in the power industry has long lag times, so younger organizations may not have had sufficient time to signal environmental consciousness through increasing the percentage of power from renewables.

H6: *Older organizations will talk less about renewables.*

2.3. Individual Leadership Level

CEO Gender. Identity characteristics of CEOs have been found to mitigate the relationship between entrepreneurial orientation and performance in previous studies on family business [57]. Further, research has shown that women are more likely to engage in environmental actions and to invest in renewable technologies [12,58]. However, female leadership in the transition from fossil fuels to renewables has not been widely acknowledged, or even recognized [28]. We therefore hypothesized that utilities managed by females would be more likely to source power from renewables and discuss renewables in their planning documents.

H7a: *Utilities managed by women will be more likely to talk about renewables.*

H7b: *Utilities managed by women will be more likely to source power from renewables.*

CEO Tenure: A heightened awareness of institutional norms can create value-laden choices that reflect norms and traditions more directly than immediate market needs [3]. Previous literature has demonstrated that the effect of CEO tenure on entrepreneurial orientation tends to follow an inverted-u-shaped curve, and that EO in non-family organizations tends to decline much more precipitously after about 15 years of experience [33]. Based on the nature of this curve and the high average tenure of utility management (mean = 18.2 years), we hypothesized that the length of time a manager worked in the power industry would be inversely related to the organization's positioning towards renewables.

H8a: *Managers with more experience in the power industry will be less likely to talk about renewables.*

H8b: *Managers with more experience in the power industry will be less likely to source power from renewables.*

2.4. Moderators

Rurality and Deregulation. Prior studies have investigated the connection between deregulation and the diversification of fuel mixes in electric utilities, and found that deregulation can lead to greater consumer choice, particularly when the population served values renewable energy [59,60]. As noted above, rural populations can often have reason to resist the proliferation of renewables. While some studies provide evidence that dynamism is positively correlated to green innovation [61], the effects of competition could be different for electric utilities in rural states. We therefore hypothesized that deregulated rural states would both talk less about renewables in their planning documents and be less likely to source power from renewables.

H9a: *Utilities in deregulated states with rural populations will be less likely to signal environmental consciousness in their planning documents.*

H9b: *Utilities in deregulated states with rural populations will be less likely to source energy from renewables.*

Rurality and Entrepreneurial Orientation. Entrepreneurial orientation has been associated with organization performance in the literature, and so a similar relationship with non-financial performance measures related to sustainability may also exist [62]. In a culture of proactiveness, innovation, and risk taking, we would expect that innovation in the power industry is correlated to investment in renewable technology [52]. This relationship could be particularly strong in rural states in light of the availability of undeveloped land, and previous studies have found renewable energy investments to be more likely in rural areas [38]. Therefore, we hypothesized that rurality would amplify the relationship between entrepreneurial orientation and environmental consciousness.

H10a: *Entrepreneurial orientation will have a stronger relationship on sustainability orientation in rural states.*

H10b: *Entrepreneurial orientation will have a stronger relationship to the percentage of power from renewables in rural states.*

2.5. Simultaneity

There are multiple institutional factors that influence an organization's strategic orientation [7,63]. In the context of the power industry, a utility's sustainability orientation may influence it's percentage of generation from renewables (fuel supply mix). Simultaneously, the percentage of renewables in a utility's fuel mix may influence their sustainability orientation. This relationship violates the assumption of strict exogeneity and requires appropriate statistical methods. The use of simultaneous regression models are required to accommodate the violation of this assumption [64]. In the methods section, we describe a two-stage least squares approach to test for simultaneity of the two dependent variables.

We hypothesized that organizations that talked more about renewables (and thus, a higher SO score) would have more renewables in their fuel mix. However, energy infrastructure is expensive with construction time lags. Results did not find evidence of this relationship which could be, at least in part, attributed to time between the decision to invest in renewables and ultimate delivery of renewable electricity. The second dimension of this hypothesis is that organizations with more renewables in their portfolio would more likely talk about renewables. This was a negative relationship which is interesting and worthy of deeper investigation.

H11: *Both sustainability orientation and percent power from renewables are dependent on one another*.

3. Methodology

3.1. Sample

A total of 170 electric utilities were selected for this analysis. These utilities were selected after a national search for utility Integrated Resource Plans (IRPs). Only electric distribution utilities were chosen, excluding transmission-only utilities that do not directly distribute power to end users. The selection was also limited to utilities in states that require IRPs. Further, some state regulations only require investor-owned utilities to publish IRPs, often excluding cooperatively or municipally-owned utilities.

IRPs provide a unique and powerful level of insight into electric utility planning processes, including the energy generation resources currently held and those intended to build [65]. These documents also go into detail on strategic plans to implement energy efficiency programs and invest in renewable generation. The lengths of the documents widely varied, with the word count ranging from 452 to 170,431 words with a mean of 20,319. The sample included 70 investor-owned utilities, 67 municipal utilities, 17 rural electric cooperatives, and 16 others (including community choice aggregators, non-utility electric service providers, and public utility districts).

3.2. Data Development and Analysis

Two dependent variables, sustainability orientation and percentage of power from renewables, and the independent variable of entrepreneurial orientation were developed by analyzing the language and content of IRPs, consistent with the procedure outlined by McKenny et al. [66] and implemented by various entrepreneurial orientation (Eos) studies (e.g., [6,67]). Using computer-aided text analysis (CATA), each IRP was scored for innovativeness, proactiveness, and risk-taking [49,62] and then normalized by word count. The IRPs were then analyzed with a new CATA dictionary created for sustainability orientation (SO) focused on energy efficiency and renewable resource terms (see Appendix A). We also analyzed the content of each IRP to estimate the current percent of renewables in the power supply mix, supplemented with data from utility websites and press releases. It was not possible to find fuel mix data for every utility, and therefore, the final data set included 148 of the 170 electric utilities with IRPs. Measurement error was addressed by manually coding each of the IRPs in order to ensure that the word counts were accurate in addition to managing transient error, by adjusting for the year in which the IRP was published [66]. We also took a proactive approach to managing specific factor errors in creating the new SO metric, given industry-specific terminology.

Independent variables were continuous or categorical (coded as dummy variables). At the inter-firm level, rurality was a continuous variable from the United States Census Bureau [68]. Dynamism was a binary variable denoting whether or not a state was deregulated based on data from Electric Choice [69]. Data on state renewable portfolio standards was also categorical as states could have no RPS requirements, RPS goals, or RPS standards as reported in the DSIRE database [70].

At the firm level, entrepreneurial orientation was a continuous variable built internally and based on the most recent EO CAT scanner word list to assess innovativeness, proactiveness, and risk-taking [66]. An ownership structure variable was constructed using dummy variables for the three main ownership types of investor-owned utilities, municipal utilities, and rural electric cooperatives, based on data from the Energy Information Administration [71]. There was very high collinearity between organization ownership structure and size, so we focused on ownership because of the ongoing debate in the power industry around the comparative advantages of private ownership structure [72]. At the individual leadership level, organization age and gender of the general manager were assessed by using each utility's website.

The two dependent variables, percent power from renewables and SO, did not follow a normal distribution ($p < 0.0005$ in the Shapiro-Wilk W test). We determined that percent power from renewables followed an exponential distribution by applying the Kolmogorov's D test for goodness of fit, where Prob > D = 0.1500. SO followed a Johnson SI distribution, confirmed using a Shapiro-Wilk W test where Prob < W = 0.1023. Since we hypothesized a relationship between discussing renewables in planning documents (SO score) and percent power from renewables, we chose to use simultaneous equation estimation. Since our data was finite and unbiased, the results were also of finite variance and unbiased; so, using ordinary least squares as part of our simultaneous equation estimation did not compromise the validity of our model [73].

In summary, the analysis incorporated ten variables based on theories from the energy system transition literature and resource-based institutional theory. Table 1 summarizes the variables, expected effect (sign) on the dependent variable of SO, the basic theoretical argument, and a sample of supporting literature. Table 2 provides a similar synopsis for the dependent variable of percentage of power from renewables. We further established that the independent variables were not colinear. The variance inflation factors were all smaller than 3, significantly less than the hold criterion of 10, indicating that results were unlikely to have been influenced by multicollinearity [7,74].

Table 1. Independent variables for analysis of sustainability orientation.

Variable	Expected Sign	Theory	Literature
Dynamism	Positive	Dynamism will encourage more innovative behavior	Engelen, 2015 [7]
Rurality	Negative	Rural residents will resist land use for renewables	Hyland & Bertsch, 2018 [37]
Ownership Type	Positive	Private utilities are more likely to have distributed generation	Kwoka, 2005 [53]
FirmAge	Negative	Older companies are less able to convert EO into firm performance	Wales, Monsen, & Mckelvie, 2011 [10]; Hult, 2003 [56]
Entrepreneurial Orientation	Positive	EO will be correlated to firm performance	Anderson & Eshima, 2013 [75]; Linton & Kask, 2017 [62]
Gender of CEO	Positive	Women invest more in renewable	Allison, 2019 [12]; Zelezny, Chua, & Aldrich, 2000 [58]
CEP Tenure	Negative	Higher isomorphism	Boling, Pieper, & Covin, 2016 [33]

Table 2. Independent variables for analysis of percent power from renewables.

Variable	Expected Sign	Theory	Literature
Dynamism	Positive	Dynamism will encourage more innovative behavior	Engelen, 2015 [7]
RPS	Positive	RPS will encourage adoption of renewables	Sarzynski, Larrien, & Shrimali, 2012 [8]
Rurality	Positive	Rural states will have more land available for renewables	Bergmann, Colombo, & Hanley, 2008 [43]
Ownership Type	Negative	Large private firms will have a smaller percentage of renewables	Hult, 2003 [56], Meade & Söderberg, 2020 [54]
Entrepreneurial Orientation	Positive	EO will be correlated to firm performance	Anderson & Eshima, 2013 [75]; Linton & Kask, 2017 [62]
Gender of CEO	Positive	Women invest more in renewables	Allison, 2019 [12]; Zelezny, Chua, & Aldrich, 2000 [58]
CEO Tenure	Negative	Hihger isomorphism	Boling, Pieper, & Covin, 2016 [33]

4. Results

4.1. Main Effects: Sustainability Orientation H1a–H10a

Based on Oliver's framework, six models were developed to explore the variability in SO across electric distribution utilities. The first model explored the impact of the inter-firm variables of market dynamism (deregulation of the energy marketplace) and the percentage of rurality in the state. The second model considered the impact of ownership type and EO score. The third model looked at the impact of the gender of the organization manager on SO. The fourth model included variables at all three levels. The fifth model included interaction effects. A final model assessed the relationship between the two dependent variables via simultaneous equation estimation with organization age as the identifying variable. We report results using a standardized beta in order to compare the variables to one another more easily (Figure 2).

Results of Multiple Linear Regression for Sustainability Orientation (H1a - H10a)

	Model 1			*Model 2*			*Model 3*			*Model 4*			*Model 5*			*Model 6*		
	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***
Intercept	0	0.013	****	0.000	0.017	**	0.000	0.011	****	0.000	0.022	***	0.000	0.021	***	0.000	0.03	****
Independent Variables																		
Inter-Firm Level																		
Dynamism	0.07	0.013								0.031	0.011		-0.078	0.012		0.151	0.017	
Rurality	-0.167	0	*							-0.117	0.000		-0.230	0	***	-0.210	0	***
Firm Level																		
IOU				0.008	0.014					-0.006	0.014		0.081	0.014		-0.225	0.021	
Muni				0.100	0.014					0.065	0.014		0.067	0.014		0.078	0.014	
EO				0.541	0.146	****				0.543	0.144	****	0.550	0.144	****	0.769	0.226	****
Firm Age				-0.261	0.000	***				-0.256	0.000	***	-0.256	0	***	-0.257	0	****
Individual Level																		
CEO Gender							-0.070	0.011		-0.088	0.012		-0.107	0.012		-0.073	0.012	
CEO Tenure							-0.035	0.001		-0.119	0.000		-0.117	0	*	-0.298	0	***
Interaction Terms																		
Rurality * EO													-0.106	0.001		-0.034	0.012	
Rurality * Dynamism													-0.209	0.001	**	-0.668	0.002	***
Simultaneous Equation Estimation																		
Predicted Percent Power from Renewables																-0.782	0.096	**

Model Fit

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
N	128	128	128	128	128	128
R^2	0.044	0.385	0.006	0.423	0.466	0.493
Adj R^2	0.029	0.365	-0.01	0.385	0.420	0.445
Prob > F	p =0.0588	p <0.0001	p = 0.6901	p <0.0001	p<0.0001	p<0.0001

*Notes: IOU and Muni are dummy variables and are compared to rural cooperatives. * p<0.1, ** p<0.05, ***p<0.01, ****p<0.001. N=128. Firm Age is the identifying variable for the simultaneous equation estimation.*

Figure 2. Results of the multi-regression analysis with sustainability orientation (SO) as the dependent variable. Independent variables at the leadership, firm, and inter-firm levels were all significant.

Firm-level variables appeared to explain the majority of the variation in utility SO. In particular, entrepreneurial orientation was highly predictive for SO, supporting the hypothesis that entrepreneurial orientation would be influential as a non-financial success metric of organizational performance. Utility ownership structure did not significantly alter utility positioning towards renewables, a finding that caused us to reject the hypothesis that publicly owned utilities would position themselves more aggressively towards a future powered by renewables. A key finding here was the importance of Oliver's three-tier perspective. While there was significance in the model that used only variables at the firm level, the model became much stronger when variables at all three levels were allowed to interact with one another. Including the simultaneous equation estimation in order to incorporate percentage of power from renewables, improved the model by 2.7%, and the additional term was significant and negative.

Hypothesis testing for the effect of rurality as a moderator of sustainability orientation followed the protocol implemented by Anderson et al. [76] and mapped out by Baron and Kenny [36]. We wanted to understand how the moderator, rurality, changed the effect of the independent variables, deregulation and EO, on the dependent variable SO. We hypothesized that the effect would be a gradual, steady change as the moderator changes, the most frequently assumed relationship between variables [36]. These results caused us to reject our hypothesis that entrepreneurially-oriented utilities in rural states would be more likely to discuss renewables. Rurality did, however, strengthen the negative relationship between market dynamism and sustainability orientation. When the marketplace is open to competition, utilities in rural states are even less likely to discuss renewables and efficiency. This negative relationship supports the hypothesis that market preferences in rural states run contrary to policy goals for decarbonizing the grid.

4.2. Main Effects: Power from Renewables H1b–H10b

This analysis was implemented in a similar fashion to the models above, although the variables included were not identical. At the inter-firm level (Model 1) we looked at the impact of market dynamism, renewable portfolio standards (RPS), and the rurality of the state's population to explain the variability in renewable power supply. At the firm level we tested the effects of utility ownership structure and entrepreneurial orientation on the percentage of power from renewables (Model 2). At the individual leadership level, we investigated the impact of the manager's gender on the dependent variable (Model 3). Model 4 included variables at all three levels, and Model 5 included interaction effects. Model 6 is the simultaneous equation estimation, and the identifying variable is Renewable Portfolio Standards (RPS) (Figure 3).

In this analysis, inter-firm level variables were much more relevant than in the analysis of sustainability orientation. Deregulation, rurality, and the existence of renewable portfolio standards all made it more likely for a utility to derive power from renewables. Utility ownership structure predicted more variability in this model as well. Investor-owned utilities were significantly less likely to derive power from renewables than municipal or rural utilities. The model became much stronger when variables across all levels were able to interact in Model 4. Model 5 was the strongest, however, suggesting that the rurality of a state has a significant impact on a utility's likelihood of deriving power from renewables. The inclusion of SO through the simultaneous equation estimation only explained 0.3% more variability and the new term was not significant, indicating that the amount of language a utility uses regarding renewables and efficiency is not significantly impactful on how much power they derive from renewables.

It is noteworthy that rurality strengthened the effects of both entrepreneurial orientation and deregulation on percent power from renewables. Taken alone as an independent variable, rural states were more likely to derive power from renewables as we had hypothesized. Furthermore, utilities with an entrepreneurial mindset were even more likely to derive power from renewables if they lived in rural states. However, utilities in deregulated states were much less likely to derive power from renewables. This finding pointed to a strong interaction effect between rurality and deregulation that was similar to the SO analysis. Rural utilities that need to compete for customers appear to be addressing customer preferences that run counter to policy priorities for a decarbonized grid.

Results of Multiple Linear Regression for Percent Power from Renewables (H1b - H10b)																		
	Model 1			*Model 2*			*Model 3*			*Model 4*			*Model 5*			*Model 6*		
	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***	β	S.E.	***p***
Intercept	0	0.061		0.000	0.077	****	0.000	0.050	****	0.131	0.098		0.000	0.09	*	0.000	0.107	
Independent Variables																		
Inter-Firm Level																		
Dynamism	0.336	0.058	****							0.337	0.052	****	0.160	0.052	*	0.159	0.052	*
Rurality	0.123	0.001								0.178	0.001	**	0.021	0.001		-0.027	0.002	
RPS	0.295	0.031	***							0.222	0.029	***	0.153	0.026	**	0.127	0.029	
Firm Level																		
IOU				-0.389	0.065	***				-0.384	0.057	****	-0.270	0.054	***	-0.284	0.054	***
Muni				-0.003	0.069					-0.008	0.059		0.015	0.054		0.000	0.055	
EO				0.163	0.738	*				0.153	0.637	**	0.207	0.595	**	0.320	1.303	**
~~Firm Age~~																		
Individual Level																		
CEO Gender							0.111	0.064		0.055	0.052		0.028	0.048		0.002	0.053	
CEO Tenure							-0.148	0.002	*	-0.127	0.002	*	-0.145	0.002	**	-0.166	0.002	**
Interaction Terms																		
Rurality * EO													0.057	0.041		0.031	0.045	
Rurality * Dynamism													-0.401	0.003	****	-0.446	0.004	****
Simultaneous Equation Estimation																		
Predicted Renewability Orientation																-0.145	1.051	

Model Fit						
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
N	128	128	128	128	128	128
R^2	0.256	0.188	0.036	0.429	0.533	0.536
Adj R^2	0.238	0.168	0.02	0.390	0.493	0.492
Prob > F	p<0.0001	p<0.0001	p=0.1026	p<0.0001	p<0.0001	p<0.0001

*Notes: IOU and Muni are dummy variables and are compared to rural cooperatives. * p<0.1, ** p<0.05, ***p<0.01, ****p<0.001, N = 128.*
Renewable Portfolio Standards (RPS) are the identifying variable for the simultaneous equation estimation.

Figure 3. Results of the multi-regression analysis with percent power from renewables as the dependent variable.

5. Discussion

These findings add quantitative rationale to policy decisions related to utility leadership, organizational structure, and state-level characteristics. In addition, this research significantly adds to the literature on resource-based institutional theory, and to environmental management research more broadly. This work additionally builds on the management literature by identifying favorable conditions for sustainability entrepreneurs interested in collaborating with electric utilities, and adds a new dimension to research on entrepreneurial orientation by examining a regulated industry.

A recent literature review noted a general lack of meso-level studies in resource-based institutional theory at the industry level, noting that most research is concerned with the individual/firm level, while industry-wide studies are highly uncommon [77]. By including all electric distribution utilities across the United States which filed an IRP, this study is built on a data set that provides a true meso-level perspective on drivers of organization heterogeneity. Our findings indicate that this three-tiered model is important when assessing drivers of firm strategy, and significant results were achieved when variables from the leadership, firm, and inter-firm level were all included.

The majority of research on entrepreneurial orientation is based on data from private organizations, where firm success can be measured by growth and profitability. The regulated power industry is fundamentally different because their growth and profitability are determined by regulators. This research applied an alternate set of success metrics related to firm adoption of national decarbonization initiatives, a regulatory priority that utilities are being asked to incorporate into their planning. The variable of entrepreneurial orientation was associated with these non-traditional indicators of firm success at fulfilling regulatory priorities. This research thus suggests that entrepreneurial orientation can be useful in studying drivers of environmental consciousness in regulated industries.

In addition, this research contributes to the management literature by proposing a new variable for assessing organization performance in the power industry. Sustainability orientation is measured using a novel assessment technique based on the frequency of language about renewables and efficiency that occur in utility planning documents. This new computer-aided text analysis dictionary could be used to compare and contrast an organization's commitment to climate change mitigation in other regulated industries, such as heating or transportation.

A key learning from this study relates to rurality, suggesting that the energy transition in rural areas is unfolding differently than in more populated regions of the U.S. Utilities in rural states use more renewable energy than their more urban counterparts, but talk about it less. When local constituents can express market preferences in rural areas, this research reveals that they are less likely to emphasize renewables and efficiency in their planning. However, rural communities have some of the highest energy burdens in the country, given aging infrastructure, inefficient oil-based heating systems, long commuting distances, and chronic rural poverty. These results expose a potential risk that the transition to renewables could be developing in a way that is not meeting the needs of this vulnerable population.

This research also finds that large, privately owned utilities were significantly less likely to derive power from renewables. This reinforces the findings of Kwoka [53], that privately owned utilities are less likely to source power from renewables. Recently, California mayors submitted a petition to turn Pacific Gas and Electric, one of the largest investor owned utilities in the country, into a cooperative utility [72]. Our results suggest that this type of transition could increase the likelihood of an organization deriving energy from renewables.

We also found that the age of the organization and the tenure of the CEO make a difference in how a utility approaches the energy transition. Older organizations were less likely to talk about renewables and efficiency in their IRPs compared to newer utilities, echoing existing research that shows that older organizations are less likely to convert entrepreneurial orientation into organization performance [75]. Younger organizations appear to be leaning into the transition to renewables more aggressively, a finding that echoes the work of other researchers who have reported "learning impediments" in older organizations which make it difficult for them to adapt to new [78]. CEO tenure also had a significantly negative impact on percentage of power from renewables. The average tenure of CEOs in our data set was 20 years, five years beyond the mid-point suggested by [33] where entrepreneurial orientation begins to decline. A CEO's extended exposure to industry norms and selection of enduring paradigms earlier in their careers appears to limit their willingness to embrace the energy system [35]. These results suggest that younger, less entrenched top management might be a key to expediting the energy system transition.

In summary, these models provide insight into a deeply complex system. Utilities are regime actors, responsible for providing a critical resource to the economy. Their ability to provide affordable, reliable power is a matter of national security, and therefore, a more conservative approach to risk management and an associated heightened sense of caution around innovation is not only expected, but necessary. Nevertheless, our national security is also threatened by climate change. As policy makers seek to balance these critical priorities, research like this can shed light on which levers will be most impactful and emphasize the importance of developing a different approach to the rural energy transition in particular.

6. Research Limitations and Future Directions

Analysis was limited by the availability of data. Only 33 states require distribution utilities to publish Integrated Resource Plans (IRPs), and some of those states only require investor-owned utilities to publish these reports [79] It was also difficult to find current data on utility fuel mixes, as this data point often did not exist or was buried in the IRP. Additional IRPs and more data on utility fuel mixes would have strengthened this study.

There was also a scarcity of data on utilities managed by women, with only 27 utilities identified as having a female manager. A recent article noted that the role of female leadership in the transition from fossil fuels to renewables, has not been widely analyzed or even recognized [28]. Our data revealed that the average percentage of energy generated from renewables among male-led utilities was 29.7%, while the average for female-led utilities was 36.5%. However, due in part to the small sample size of female-led utilities, the difference was not significant. While the relationship between female leadership and renewables was not ultimately conclusive, it was certainly suggestive.

The results of the simultaneous equation estimation were unexpected and could be further explored in future analyses. Our results predicted that the more power a utility derives from renewables, the less likely they are to talk about renewables and efficiency. This could be due to a nonlinear relationship between the two variables, an event that is frequently evidenced in the literature on entrepreneurial orientation [80]. There could also be a temporal element to the relationship between SO and the percentage of power from renewables, as utilities with less renewable energy in their fuel mix plan for more aggressive installations in the future, while utilities who are ahead of the curve see less need to address renewables in their planning documents. In other words, talking at length about renewables may occur when a utility is in the early planning stages. Another possibility is that many utilities that derive a high percentage of power from renewables may accomplish this by being located next to a large amount of inexpensive hydro-electric power or wind turbines, and thus, may be choosing renewables because they are competitive and readily available, rather than from a strong renewable orientation. More granular data on the fuel mix or deconstructing SO into two separate motivations of efficiency and effectiveness might shed further light on this finding.

An important next step for this research would be to do a more deliberate investigation of the rural energy transition. This analysis suggests that the current approach to deploying renewables in rural areas is not supported by local constituents. Qualitative research with stakeholders in rural areas could reframe national thinking on rural renewables deployment, examining ways in which rural communities differ from urban centers and finding ways to more collaboratively envision and develop a just and decarbonized energy future.

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Appendix A. Word List for Sustainability Orientation

Achievable Potential; Acid Rain; Additionality; Advanced Metering Infrastructure; Advanced Rate Design; American Recovery and Reinvestment Act of 2009; Behavior-Based Programs; Blower Door; Coincidental Peak Factor; Combined Heat and Power; Comprehensive Home Energy Audits; Critical Peak Pricing; Decoupling; Demand Response; Demand-Side Management; Distributed Energy Resource; Distributed Generation; Distributed Power; Emerging Technology; Energy Conservation; Energy Efficiency Measure; Energy Efficiency Potential; Energy Efficiency Resource Standard; Feebate; Flexible Fuel Vehicle; Fuel Cell Vehicle; Global Warming; Green Building; Greenhouse Gas; Heat Pump; High Performance Building; In-Home Display; Industrial Ecology; Load Shifting; Market Transformation; Peak Shaving; Plug-in Hybrid-Electric Vehicle; Post-Occupancy Evaluation; Real Time Pricing; Recycled Energy; Renewable Generation; Smart Meter; Time of Use Rates; Utility Restructuring; Weatherization; AFV; Biofuels; Biomass; C-BED; CIP; Cogeneration; Combined Cycle; Distributed Generation (DG); DSM; Energy Conservation; Energy Efficiency; Greenhouse gases; Greenhouse; Net metering; NEM; PACE; Property Assessed Clean Energy (PACE); PV; RDF; REC; Renewable Energy Certificate; Renewable Resources; RES; Renewable Energy Standard; RPS; Renewable Portfolio Standard; Societal Benefits Charge; SREC; Solar; Solar Renewable Energy Certificate; Unbundling; Wind; Turbine.

References

1. Geels, F.W. The dynamics of transitions in socio-technical systems: A multi-level analysis of the transition pathway from horse-drawn carriages to automobiles (1860–1930). *Technol. Anal. Strateg. Manag.* **2005**, *17*, 445–476. [CrossRef]
2. Geels, F.W.; Sovacool, B.K.; Schwanen, T.; Sorrell, S. Sociotechnical transitions for deep decarbonization. *Science* **2017**, *357*, 1242–1244. [CrossRef] [PubMed]
3. Oliver, C. Sustainable competitive advantage: Combining institutional and resource-based views. *Strateg. Manag. J. 1997 18*, 697–713. [CrossRef]
4. Short, J.C.; Broberg, J.C.; Cogliser, C.C.; Brigham, K.H. Construct validation using computer-aided text analysis (CATA) an illustration using entrepreneurial orientation. *Organ. Res. Methods* **2010**, *13*, 320–347. [CrossRef]
5. Dickson, P.H.; Weaver, K.M. The role of the institutional environment in determining firm orientations towards entrepreneurial behavior. *Int. Entrep. Manag. J.* **2008**, *2008 4*, 467–483. [CrossRef]
6. Wales, W.J. Entrepreneurial orientation: A review and synthesis of promising research directions. *Int. Small Bus. J.* **2016**, *34.1*, 3–15. [CrossRef]
7. Engelen, A.; Schmidt, S.; Buchsteiner, M. The Simultaneous Influence of National Culture and Market Turbulence on Entrepreneurial Orientation: A Nine-country Study. *J. Int. Manag.* **2015**, *21*, 18–30. [CrossRef]
8. Sarzynski, A.; Larrieu, J.; Shrimali, G. The impact of state financial incentives on market deployment of solar technology. *Energy Policy* **2012**, *46*, 550–557. [CrossRef]
9. Chen, M.-J.; Hambrick, D.C. Speed, stealth, and selective attack: How small firms differ from large firms in com-petitive behavior. *Acad. Manag. J.* **1995**, *38*, 453–482. [CrossRef]
10. Wales, W.; Monsen, E.; McKelvie, A. The Organizational Pervasiveness of Entrepreneurial Orientation. *Entrep. Theory Pract.* **2011**, *35*, 895–923. [CrossRef]
11. Jones, K.B.; Bennett, E.C.; Ji, F.W.; Kazerooni, B. Beyond community solar: Aggregating local distributed resources for resilience and sustainability. In *Innovation and Disruption at the Grid's Edge*; Elsevier: Amsterdam, The Netherlands, 2017; pp. 65–81.
12. Allison, J.E.; McCrory, K.; Oxnevad, I. Closing the renewable energy gender gap in the United States and Canada: The role of women's professional networking. *Energy Res. Soc. Sci.* **2019**, *55*, 35–45. [CrossRef]
13. American Council for an Energy-Efficient Economy. Glossary of Terms. 2019. Available online: https://www.aceee.org/glossary_data (accessed on 5 September 2022).
14. Clean Energy Resource Teams. Energy Terms Glossary. 2019. Available online: https://www.cleanenergyresourceteams.org/glossary (accessed on 5 September 2022).
15. Roxas, B.; Ashill, N.; Chadee, D. Effects of Entrepreneurial and Environmental Sustainability Orientations on Firm Performance: A Study of Small Businesses in the Philippines. *J. Small Bus. Manag.* **2016**, *55*, 163–178. [CrossRef]
16. Adomako, S.; Amankwah-Amoah, J.; Danso, A.; Konadu, R.; Owusu-Agyei, S. Environmental sustainability orientation and performance of family and nonfamily firms. *Bus. Strategy Environ.* **2019**, *28*, 1250–1259. [CrossRef]
17. Amankwah-Amoah, J.; Danso, A.; Adomako, S. Entrepreneurial orientation, environmental sustainability and new venture performance: Does stakeholder integration matter? *Bus. Strategy Environ.* **2019**, *28*, 79–87. [CrossRef]
18. Danso, A.; Adomako, S.; Lartey, T.; Amankwah-Amoah, J.; Owusu-Yirenkyi, D. Stakeholder integration, environ-mental sustainability orientation and financial performance. *J. Bus. Res.* **2019**, *119*, 652–662. [CrossRef]

19. Calic, G.; Mosakowski, E. Kicking off social entrepreneurship: How a sustainability orientation influences crowd-funding success. *J. Manag. Stud.* **2016**, *53*, 738–767. [CrossRef]
20. Cohen, B.; Smith, B.; Mitchell, R. Toward a sustainable conceptualization of dependent variables in entrepreneur-ship research. *Bus. Strategy Environ.* **2008**, *17*, 107–119. [CrossRef]
21. Collins, E.; Lawrence, S.; Pavlovich, K.; Ryan, C. Business networks and the uptake of sustainability practices: The case of New Zealand. *J. Clean. Prod.* **2007**, *15*, 729–740. [CrossRef]
22. Kuckertz, A.; Wagner, M. The influence of sustainability orientation on entrepreneurial intentions—Investigating the role of business experience. *J. Bus. Ventur.* **2010**, *25*, 524–539. [CrossRef]
23. Patzelt, H.; Shepherd, D.A. Recognizing Opportunities for Sustainable Development. *Entrep. Theory Pract.* **2011**, *35*, 631–652. [CrossRef]
24. Schaltegger, S. A framework for ecopreneurship: Leading bioneers and environmental managers to ecopreneurship. *Greener Manag. Int.* **2002**, *38*, 45–58. [CrossRef]
25. Stephens, J.C.; Kopin, D.J.; Wilson, E.J.; Peterson, T.R. Framing of customer engagement opportunities and renewable energy integration by electric utility representatives. *Util. Policy* **2017**, *47*, 69–74. [CrossRef]
26. Finkelstein, S.; Cannella, S.F.B.; Hambrick, D.C.; Cannella, A.A. *Strategic Leadership: Theory and Research On Executives, Top Management Teams, And Boards*; Oxford University Press: Oxford, UK, 2009.
27. Cook, L. The industry with the most female CEOs isn't what you'd expect. *Wall Street J.* **2018**.
28. Allen, E.; Lyons, H.; Stephens, J.C. Women's leadership in renewable transformation, energy justice and energy democracy: Redistributing power. *Energy Res. Soc. Sci.* **2019**, *57*, 101233. [CrossRef]
29. Pearl-Martinez, R.; Stephens, J.C. Toward a gender diverse workforce in the renewable energy transition. *Sustain. Sci. Pract. Policy* **2016**, *12*, 8–15. [CrossRef]
30. Goktan, A.B.; Gupta, V.K. Sex, gender, and individual entrepreneurial orientation: Evidence from four countries. *Int. Entrep. Manag. J.* **2015**, *11*, 95–112. [CrossRef]
31. Lim, S.; Envick, B.R. Gender and entrepreneurial orientation: A multi-country study. *Int. Entrep. Manag. J.* **2011**, *9*, 465–482. [CrossRef]
32. Runyan, R.C.; Huddleston, P.; Swinney, J. Entrepreneurial orientation and social capital as small firm strategies: A study of gender differences from a resource-based view. *Int. Entrep. Manag. J.* **2006**, *2*, 455–477. [CrossRef]
33. Boling, J.R.; Pieper, T.M.; Covin, J.G. CEO Tenure and Entrepreneurial Orientation within Family and Nonfamily Firms. *Entrep. Theory Pract.* **2016**, *40*, 891–913. [CrossRef]
34. Hambrick, D.C.; Finkelstein, S.; Cho, T.S.; Jackson, E.M. Isomorphism in reverse: Institutional theory as an explanation for recent increases in intraindustry heterogeneity and managerial discretion. *Res. Organ. Behav.* **2004**, *26*, 307–350. [CrossRef]
35. Hambrick, D.C.; Fukutomi, G.D. The seasons of a CEO's tenure. *Acad. Manag. Rev.* **1991**, *16*, 719–742. [CrossRef]
36. Baron, R.M.; Kenny, D.A. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J. Personal. Soc. Psychol.* **1986**, *51*, 1173. [CrossRef]
37. Hyland, M.; Bertsch, V. The role of community involvement mechanisms in reducing resistance to energy infrastructure development. *Ecol. Econ.* **2018**, *146*, 447–474.
38. Marsden, T. Exploring the Rural Eco-Economy: Beyond Neoliberalism. *Sociol. Rural.* **2016**, *56*, 597–615. [CrossRef]
39. Naumann, M.; Rudolph, D. Conceptualizing rural energy transitions: Energizing rural studies, ruralizing energy research. *J. Rural Stud.* **2019**, *73*, 97–104. [CrossRef]
40. Morrison, C.; Ramsey, E. Power to the people: Developing networks through rural community energy schemes. *J. Rural Stud.* **2018**, *70*, 169–178. [CrossRef]
41. Slama, K. Rural culture is a diversity issue. *Minn. Psychol.* **2004**, *53*, 9–12.
42. Späth, P.; Rohracher, H. 'Energy regions': The transformative power of regional discourses on socio-technical futures. *Res. Policy* **2010**, *39*, 449–458. [CrossRef]
43. Bergmann, A.; Colombo, S.; Hanley, N. Rural versus urban preferences for renewable energy developments. *Ecol. Econ.* **2008**, *65*, 616–625. [CrossRef]
44. Munday, M.; Bristow, G.; Cowell, R. Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity? *J. Rural. Stud.* **2011**, *27*, 1–12. [CrossRef]
45. Baumber, A.P.; Merson, J.; Ampt, P.; Diesendorf, M. The adoption of short-rotation energy cropping as a new land use option in the New South Wales Central West. *Rural Soc.* **2011**, *20*, 266–279. [CrossRef]
46. Kunze, C.; Hertel, M. Contested deep geothermal energy in Germany—The emergence of an environmental protest movement. *Energy Res. Soc. Sci.* **2017**, *27*, 174–180. [CrossRef]
47. Baker, W.E.; Sinkula, J.M. The Complementary Effects of Market Orientation and Entrepreneurial Orientation on Profitability in Small Businesses. *J. Small Bus. Manag.* **2009**, *47*, 443–464. [CrossRef]
48. Covin, J.G.; Green, K.M.; Slevin, D.P. Strategic Process Effects on the Entrepreneurial Orientation–Sales Growth Rate Relationship. *Entrep. Theory Pract.* **2006**, *30*, 57–81. [CrossRef]
49. Rauch, A.; Wiklund, J.; Lumpkin, G.T.; Frese, M. Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrep. Theory Pract.* **2009**, *33*, 761–787. [CrossRef]

50. Marino, L.; Strandholm, K.; Steensma, H.K.; Weaver, K.M. The moderating effect of national culture on the relationship between entrepreneurial orientation and strategic alliance portfolio extensiveness. *Entrep. Theory Pract.* **2002**, *26*, 145–160. [CrossRef]
51. Zahra, S.A. A Conceptual Model of Entrepreneurship as Firm Behavior: A Critique and Extension. *Entrep. Theory Pract.* **1993**, *17*, 5–21. [CrossRef]
52. Dedrick, J.; Venkatesh, M.; Stanton, J.M.; Zheng, Y.; Ramnarine-Rieks, A. Adoption of smart grid technologies by electric utilities: Factors influencing organizational innovation in a regulated environment. *Electron. Mark.* **2014**, *25*, 17–29. [CrossRef]
53. Kwoka, J.E., Jr. The comparative advantage of public ownership: Evidence from US electric utilities. *Can. J. Econ./Rev. Can. D'économique* **2005**, *38*, 622–640. [CrossRef]
54. Meade, R.; Söderberg, M. Is welfare higher when utilities are owned by customers instead of investors? Evidence from electricity distribution in New Zealand. *Energy Econ.* **2020**, *86*, 104700. [CrossRef]
55. Energy Information Administration. Investor-Owned Utilities Served 72% of U.S. Electricity Customers in 2017. 2019. Available online: https://www.eia.gov/todayinenergy/detail.php?id=40913# (accessed on 5 September 2022).
56. Hult, G.T.M.; Snow, C.C.; Kandemir, D. The role of entrepreneurship in building cultural competitiveness in different organizational types. *J. Manag.* **2003**, *29*, 401–426.
57. Miller, D.; Le Breton–Miller, I. Governance, Social Identity, and Entrepreneurial Orientation in Closely Held Public Companies. *Entrep. Theory Pract.* **2011**, *35*, 1051–1076. [CrossRef]
58. Zelezny, L.C.; Chua, P.P.; Aldrich, C. New ways of thinking about environmentalism: Elaborating on gender differences in environmentalism. *J. Soc. Issues* **2000**, *56*, 443–457. [CrossRef]
59. Carley, S. Distributed generation: An empirical analysis of primary motivators. *Energy Policy* **2009**, *37*, 1648–1659. [CrossRef]
60. Delmas, M.; Russo, M.V.; Montes-Sancho, M.J. Deregulation and environmental differentiation in the electric utility industry. *Strateg. Manag. J.* **2007**, *28*, 189–209. [CrossRef]
61. Chan, H.K.; Yee, R.W.; Dai, J.; Lim, M.K. The moderating effect of environmental dynamism on green product innovation and performance. *Int. J. Prod. Econ.* **2016**, *181*, 384–391. [CrossRef]
62. Linton, G.; Kask, J. Configurations of entrepreneurial orientation and competitive strategy for high performance. *J. Bus. Res.* **2017**, *70*, 168–176. [CrossRef]
63. Ang, S.H.; Benischke, M.H.; Doh, J.P. The interactions of institutions on foreign market entry mode. *Strat. Manag. J.* **2014**, *36*, 1536–1553. [CrossRef]
64. Maddala, G.S.; Lahiri, K. *Introduction to Econometrics*, 4th ed.; Wiley: Hoboken, NJ USA, 2009.
65. Wright, J.G.; Bischof-Niemz, T.; Calitz, J.; Mushwana, C.; van Heerden, R.; Senatla, M. Formal Comments on the Integrated Resource Plan (Irp) Update Assumptions, Base Case and Observations 2016. Pretoria, South Africa. 2017. Available online: https://www.csir.co.za/sites/default/files/Documents/20170331CSIR_EC_DOE.pdf (accessed on 5 September 2022).
66. McKenny, A.F.; Aguinis, H.; Short, J.C.; Anglin, A.H. What doesn't get measured does exist: Improving the accuracy of computer-aided text analysis. *J. Manag.* **2016**, *44*, 2909–2933. [CrossRef]
67. Covin, J.G.; Wales, W.J. The Measurement of Entrepreneurial Orientation. *Entrep. Theory Pract.* **2012**, *36*, 677–702. [CrossRef]
68. United States Census Bureau. *H2. Housing Units by Urban and Rural From the 2010 US Census of Population and Housing: Summary File 1 Database Shown as Count*; SAGE Publications, Inc.: Thousand Oaks, CA, USA, 2010.
69. Electric Choice. Map of deregulated energy states and markets. 2018. Available online: https://www.electricchoice.com/map-deregulated-energy-markets/ (accessed on 5 September 2022).
70. NC Clean Energy Technology Center. DSIRE: Database of renewable portfolio standard policies. In *Energy Efficiency & Renewable Energy*; DSIRE (Database of State Incentives for Renewables & Efficiency), Ed.; NC Clean Energy Technology Center, NC State University: Raleigh, NC, USA, 2018.
71. Energy Information Administration. Electric Sales, Revenue, and Average Price. 2017. Available online: https://www.eia.gov/electricity/sales_revenue_price/ (accessed on 5 September 2022).
72. Penn, I. California mayors back plan to make PG&E a cooperative. *New York Times*, 26 November 2019.
73. Tellinghuisen, J. Least squares with non-normal data: Estimating experimental variance functions. *Analyst* **2007**, *133*, 161–166. [CrossRef]
74. Brettel, M.; Engelen, A.; Voll, L. Letting Go to Grow-Empirical Findings on a Hearsay. *J. Small Bus. Manag.* **2010**, *48*, 552–579. [CrossRef]
75. Anderson, B.S.; Eshima, Y. The influence of firm age and intangible resources on the relationship between entrepreneurial orientation and firm growth among Japanese SMEs. *J. Bus. Ventur.* **2013**, *28*, 413–429. [CrossRef]
76. Anderson, B.S.; Covin, J.G.; Slevin, D.P. Understanding the relationship between entrepreneurial orientation and strategic learning capability: An empirical investigation. *Strat. Entrep. J.* **2009**, *3*, 218–240. [CrossRef]
77. Su, J.; Zhai, Q.; Karlsson, T. Beyond red tape and fools: Institutional theory in entrepreneurship research, 1992–2014. *Entrep. Theory Pract.* **2017**, *41*, 505–531.
78. Autio, E.; Sapienza, H.J.; Almeida, J.G. Effects of age at entry, knowledge intensity, and imitability on international growth. *Acad. Manag. J.* **2000**, *43*, 909–924.

79. American Wind Energy Association. *Electricity Policy IRPs*; AWEA of American Clean Power Association: Washington, DC, USA, 2020.
80. Wales, W.J.; Patel, P.C.; Parida, V.; Kreiser, P.M. Nonlinear Effects of Entrepreneurial Orientation on Small Firm Performance: The Moderating Role of Resource Orchestration Capabilities. *Strat. Entrep. J.* **2013**, *7*, 93–121. [CrossRef]