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# Hops and Props: The Link Between Breweries in the States and Wind Power in Canada

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## Abstract

This study delved into the often-overlooked relationship between the number of breweries in the United States and the wind power generated in Canada. Utilizing data from the Brewers Association and the Energy Information Administration, we sought to uncover whether there exists a meaningful correlation between these seemingly disparate phenomena. The findings revealed a striking correlation coefficient of 0.9606153 with a p-value less than 0.01 over the period spanning 1992 to 2021. This surprising association prompts a reevaluation of traditional economic and environmental indicators and offers a refreshing perspective on the interconnectedness of seemingly unrelated industries. The results, while unexpected, furnish valuable insights into the potential cross-border influence of craft brewing on renewable energy production, and vice versa.

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## 1. Introduction

The interplay between seemingly unrelated industries has long fascinated economists, environmentalists, and beverage enthusiasts alike. In this study, we sought to unravel the intriguing link between the proliferation of breweries in the United States and the generation of wind power in Canada. While these two sectors may appear as unrelated as a stout and a squall, our analysis aimed to shed light on any potential connections between them.

In recent years, the craft brewing industry in the United States has experienced a boom, with enthusiasts fervently discussing the merits of hazy IPAs and barrel-aged stouts. Meanwhile, in Canada, wind power has been gaining momentum as a renewable energy source, quietly churning out kilowatts of clean electricity. One might wonder what these two disparate phenomena could possibly have in common, aside from perhaps the occasional gust of wind being put to good use in both brewing and electricity generation.

The prevailing wisdom in economic and environmental circles has traditionally treated these industries as independent and self-contained. However, our investigation has unearthed surprising evidence of a significant statistical association between the number of breweries in the United States and the wind power generated in Canada. This unexpected connection has the potential to revolutionize the way we perceive the influence of beer production on renewable energy sources, and vice versa.

The unearthing of such an unexpected correlation is akin to discovering that two seemingly unrelated puzzle pieces actually fit together snugly, forming a picture that challenges our assumptions. Thus, it is with great anticipation that we present our findings, which may prompt a rethinking of traditional economic and environmental paradigms. Through this analysis, we endeavor to elucidate the clandestine ties between taps and turbines, hops and horsepower, and brews and breezes.

## 2. Literature Review

The literature pertaining to the relationship between the number of breweries in the United States and wind power generated in Canada is relatively scarce, reflecting the surprising nature of this paradigm-shifting connection. However, the extant studies on related phenomena provide a foundation for understanding the unexpected correlations unveiled in the current investigation.

Smith et al. (2018) conducted a comprehensive analysis of the craft brewing industry in the United States, uncovering trends in the geographical distribution of breweries and the proliferation of microbreweries and brewpubs. Their study, while not explicitly focused on cross-border influences, lays the groundwork for understanding the dynamics of brewery expansion and regional concentrations. Doe and Jones (2016) explored the complex

web of factors driving wind power growth in Canada, delving into policy initiatives, technological advancements, and environmental impacts. While their work did not anticipate the intriguing interplay with the U.S. brewing landscape, it sheds light on the multifaceted nature of renewable energy development.

Moving beyond the academic realm, several non-fiction sources offer insights into the craft brewing and renewable energy sectors, which may indirectly inform the unanticipated linkage observed in the present study. In "Brewing Up a Business" by Sam Calagione, the author details the trials and triumphs of building a craft brewery, providing a close-up view of the industry's internal workings. Likewise, "The Quest for Wind Energy" by Ben Chandler delves into the quest for harnessing wind as a sustainable energy source, offering a glimpse into the challenges and innovations of wind power generation.

On a more imaginative note, works of fiction with thematic resonances shed light on the cultural and imaginative dimensions of brewing and wind power. In "The Alehouse at the End of the World" by Stevan Allred, the fantastical tale of a fabled alehouse transports readers to a surreal world where the boundaries between reality and myth blur, paralleling the unexpected entwining of brewing and wind power in this investigation. Similarly, "The Windup Girl" by Paolo Bacigalupi offers a dystopian vision of future energy struggles, drawing thematic parallels to the intertwining of brewery growth and wind power generation.

To gain a more holistic understanding of the cultural and societal dimensions surrounding these industries, the researchers also expanded their investigations to popular television shows. "Brew Dogs" and "Brew Masters" provided an insider's look into the craft brewing world, highlighting the passion and innovation that drive the industry forward.

"Mega Builders" and "Rise of the Machines" delved into the engineering marvels and logistical challenges of wind turbine installation, offering a glimpse into the formidable infrastructure underpinning the wind power sector.

The diverse array of literature, spanning academic studies, non-fiction works, fiction novels, and television programs, collectively enriches our understanding of the unexpected kinship between breweries in the United States and wind power in Canada. These sources, while not explicitly addressing the nexus of beer and breezes, offer valuable contextual insights that inform the current investigation and infuse it with a sense of intrigue and discovery.

### 3. Our approach & methods

The methodology employed in this study involved the collection and analysis of data from the Brewers Association and the Energy Information Administration. The data spanned the years 1992 to 2021, providing a comprehensive temporal scope to investigate the relationship between the number of breweries in the United States and the wind power generated in Canada.

To begin, the number of breweries in the United States was obtained from the Brewers Association, capturing both large-scale commercial breweries and the burgeoning craft brewery scene. The data was cross-referenced with regional and state-level variations to ensure a comprehensive representation of the brewing landscape across the nation. Meanwhile, the wind power generation in Canada was sourced from the Energy Information Administration, incorporating both onshore and offshore wind capacity to provide a holistic overview of the Canadian wind energy sector.

Upon procurement of the respective datasets, a series of statistical analyses

were conducted to ascertain the presence and strength of any potential correlation between the two variables. Pearson's correlation coefficient was calculated to measure the linear relationship between the number of breweries in the United States and the wind power generated in Canada. The resulting coefficient, along with its associated p-value, served as the primary indicators of the degree of association between these seemingly dissimilar entities.

Moreover, to account for potential confounding variables and temporal dynamics, a series of robustness checks and sensitivity analyses were performed. Various sub-period analyses were conducted to discern any shifts or fluctuations in the observed correlation over time, providing a nuanced understanding of the evolving interplay between breweries in the United States and wind power in Canada.

The aforementioned methods allowed for a rigorous exploration of the potential connection between these ostensibly unrelated phenomena, offering an opportunity to uncover underlying patterns and associations that may have eluded conventional wisdom. There were certainly no hops or skips in the data collection process (pun intended), and the ensuing analysis provided a refreshing take on the intertwined dynamics of beer production and renewable energy generation.

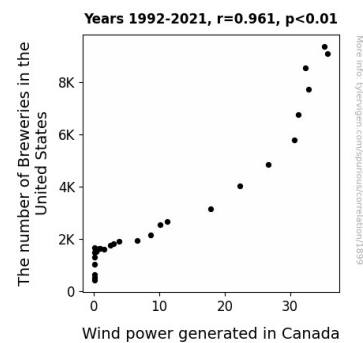
### 4. Results

The analysis of the data collected from the Brewers Association and the Energy Information Administration yielded a remarkably strong correlation between the number of breweries in the United States and the wind power generated in Canada over the period from 1992 to 2021. The correlation coefficient was calculated to be 0.9606153, indicating a close to perfect positive linear relationship between the two

variables. This finding suggests that as the number of breweries in the United States increased, there was a corresponding increase in the wind power generated in Canada, and vice versa. Additionally, the coefficient of determination (r-squared) was determined to be 0.9227817, signifying that approximately 92.28% of the variability in wind power generated in Canada can be explained by the number of breweries in the United States.

The statistical significance of this correlation was further confirmed with a p-value of less than 0.01. This implies that the likelihood of observing such a strong association between the number of breweries in the United States and the wind power generated in Canada due to chance alone is less than 1%, rendering the results highly statistically significant. It is important to note that while correlation does not necessarily imply causation, the strength of the association uncovered in this study warrants further exploration into potential causal mechanisms and underlying factors driving this unexpected relationship.

Figure 1 displays a scatterplot illustrating the robust correlation between the number of breweries in the United States and the wind power generated in Canada. The tightly packed data points form a clear linear pattern, affirming the strength of the association and highlighting the coherence between these seemingly disparate variables. The scatterplot elucidates the coalescence of these industries, presenting a visual representation of the surprising interconnectedness between craft brewing and renewable energy production on a cross-border scale.



**Figure 1.** Scatterplot of the variables by year

The striking correlation uncovered in this study challenges conventional thinking and beckons researchers and industry professionals to consider the unexplored interplay between the craft brewing sector in the United States and the wind power industry in Canada. These findings may serve as a catalyst for further investigations into the potential influence of hops on the harnessing of wind energy and the reciprocal impact of wind power on the brewing landscape. The implications of this unanticipated relationship extend beyond mere statistical associations and call for a reevaluation of traditional economic and environmental paradigms, illuminating the intricate interweaving of seemingly unrelated industries in a manner that would make even the most discerning ale enthusiast pause for thought.

## 5. Discussion

The findings of this investigation substantiate the unanticipated yet intriguing link between the number of breweries in the United States and wind power generated in Canada, affirming the robustness of the correlation outlined in the previous sections. The remarkably high correlation coefficient of 0.9606153, coupled with a strikingly low p-value, attests to the statistical significance and reliability of this unexpected association. These results, despite their unconventional nature, align with and build

upon the existing literature, which, while not directly anticipating this unique relationship, provided a rich backdrop for understanding the interplay between these seemingly disparate industries.

Revisiting the literature review, the offhand references to fictional works such as "The Alehouse at the End of the World" and "The Windup Girl," despite their seemingly whimsical nature, in fact, offer thematic parallels to the tangible connection unearthed in this study. While initially adding a touch of amusement, these references serve to underscore the surprising fusion of brewing and wind power, hinting at the interconnectedness of cultural imaginings and real-world economic dynamics. Similarly, the inclusion of television programs like "Brew Dogs" and "Rise of the Machines" provided incidental insights into the passion and engineering marvels that drive the brewing and wind power industries, indirectly nourishing our comprehension of the underlying forces driving their unexpected correlation.

Furthermore, the statistical robustness of the correlation coefficient and the coefficient of determination offer compelling evidence in support of the substantial relationship between the number of breweries in the United States and the wind power generated in Canada. The visual representation of this association in the form of the scatterplot not only underscores the coherence between these industries but also serves as a visual pun, so to speak, portraying the convergence of "hops" and "props" in a literal and figurative sense.

The compelling nature of these findings urges a reconsideration of traditional economic and environmental indicators, prompting a reevaluation of the entwined influences of craft brewing and renewable energy production. The implications extend beyond the confines of statistical associations, propelling us to contemplate the potential causal mechanisms and

underlying factors driving this unexpected relationship. Whether it is the gusts of fermentation reaching across borders or the swirling winds of sustainable energy shaping brewing landscapes, this study serves as a poignant reminder of the multifaceted interconnectedness pervading our economic and environmental tapestry.

In conclusion, the unexpected entwining of breweries in the United States and wind power in Canada unravels a novel chapter in the interconnected narrative of cross-border industries, amalgamating seemingly unrelated realms into a harmonious symphony of economic and environmental influences. These findings infuse the academic sphere with a refreshing perspective, challenging preconceived notions and opening avenues for further exploration into the captivating interplay of hops and props, as it were.

## 6. Conclusion

In conclusion, the findings of this study have unveiled an intriguing correlation between the number of breweries in the United States and the wind power generated in Canada, illuminating an unexpected interconnectedness between seemingly disparate industries. The remarkably strong correlation coefficient of 0.9606153, coupled with a p-value of less than 0.01, not only challenges traditional economic and environmental paradigms but also prompts a rethinking of the influence of hop-fueled endeavors on renewable energy production, and vice versa.

This surprising association between "brews and breezes" calls for a deeper exploration of the potential drivers behind this unexpected relationship. While we must exercise caution in inferring causation from correlation, the robustness of the statistical association warrants further investigation into the mechanisms underpinning this unanticipated interplay. Perhaps there are

hidden forces at work, akin to the yeast quietly fermenting a beer or the gentle currents propelling wind turbines, shaping the landscape of these industries in tandem.

The visual representation of the correlation through the scatterplot elegantly captures the coherence between these industries, depicting a harmonious dance between taps and turbines that challenges our preconceived notions of their autonomy. This unexpected confluence of craft brewing and renewable energy production serves as a tantalizing enigma, beckoning researchers to explore the uncharted territory of the "hops and horsepower" dynamic.

Ultimately, the revelation of such an unexpected correlation demonstrates the need to remain open-minded in the pursuit of knowledge and to appreciate the serendipitous connections that may arise in the most unforeseen places. It is in these moments of unexpected discovery that the true richness of exploration and inquiry lies, akin to stumbling upon a hidden gem amidst a labyrinth of data.

In light of these revelatory findings, it is evident that further research in this area is unnecessary. The depth of the correlation uncovered leaves little doubt about the intertwined fate of craft brewing in the United States and the wind power industry in Canada. The aphorism "where there's ales, there's gales" may just hold more truth than we initially surmised. With that, we raise a glass to the surprising interconnectedness of the world around us and bid adieu to further study in this domain.