Powering Down and Moving On? Energy Transition, Gentrification, and Local Impacts

Jancy Ling Liu, The College of Wooster, 4704398469, jliu@wooster.edu

Section 1: Introduction

Over the past decade, fossil-fuel power plants have seen significant retirements in the United States, largely due to a shift towards renewable energy sources, rising regulatory pressure to minimize greenhouse gas emissions, and changes in electricity demand. According to the U.S. Energy Information Administration, coal will account for 85% of U.S. electric generating capacity retirements in 2022. This trend will likely continue due to the ongoing competition from renewable resources, which has sparked interest in how these structural changes in electricity generation may affect local communities. On one hand, power plants provide jobs, tax revenues, and a stable source of electricity. On the other hand, fossil-fuel power plants are associated with disamenities like noise pollution, traffic from fuel deliveries, harmful emissions like sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter (PM) that can negatively impact human health and the environment, which may have larger effects on low-income and minority communities (Depro et al., 2015).

As the energy transition accelerates, understanding its ramifications becomes increasingly important for policymakers and stakeholders seeking to navigate the complex challenges it poses. I investigate how power plant retirements influence population migration patterns in the United States, particularly in relation to potential socio-economic implications and changes in local amenities. These dynamics are essential for designing policies that support sustainable energy transitions while minimizing potential adverse impacts. As power plants close, the resulting changes in air quality, public health, employment opportunities, and local economies can have far-reaching implications for communities, influencing residential sorting patterns, and potentially exacerbating social and economic inequalities (Currie et al., 2015). By examining the relationship between socio-economic consequences and environmental amenity changes, this study aims to provide a comprehensive understanding of the effects of power plant retirements on migration patterns, enabling policymakers to develop targeted interventions that balance competing priorities and facilitate the transition for affected communities.

Section 2: Data

In this paper, I present the first national-scale analysis evaluating how migration patterns respond to the retirement of fossil-fuel power generators. My analysis utilizes a novel, granular dataset based on United States Postal Service (USPS) Change of Address (COA) records from July 2018 to December 2022. Unlike previous studies that primarily rely on the Census tract or Internal Revenue Services (IRS) data, which are updated annually at the county level, the USPS COA data offers a higher frequency and more up-to-date view of migration patterns and sorting behaviors at the zip code level on a monthly basis. Specifically, it offers aggregated COA volume originating from and destined to each zip code, allowing for a separate examination of in- and out-migration flows. By matching this data to Energy Information Administration (EIA) monthly statistics on power plant retirements, I construct a dataset aggregated to the quarter-zip code level to analyze how fossil fuel phase-outs within a region affect migration over time. To capture the effects of the energy transition, I define the treated group as any zip code that experiences the complete retirement of all fossil-fuel generators within its boundaries.

Section 3: Empirical Approach and Results

My analysis reveals three main findings regarding how the full retirement of fossil-fuel generators affects local migration patterns. First, using a staggered difference-in-difference design, I find that the full retirement of fossil-fuel generators significantly impacts local migration patterns, leading to a net increase in population after retirement. This finding aligns with previous research that observed a net increase in population following environmental improvements (Banzhaf and Walsh, 2008). However, in the context of full retirement of fossil-fuel generators, my study further shows that this net increase is driven by a decrease in both inflows and a more substantial reduction in outflows following full retirement.

This pattern differs from traditional narratives of environmental gentrification, where improved amenities drive increased in-migration of wealthier residents, displacing existing disadvantaged groups through an increase in housing costs (Sieg et al., 2004). Studies find that toxic site cleanups, Superfund remediation, and air pollution reductions can precipitate gentrification pressures associated with population turnover (Gamper-Rabindran and Timmins, 2011). However, my research finds that the retirement of fossil fuel generators causes a pronounced simultaneous reduction in both inflows and outflows, representing a ”stagnation effect” that captures residents’ dormant migration responses to these major energy transitions.

Specifically, I estimate that the retirement of fossil-fuel generators leads to a reduction of about 30 move-ins and 33 move-outs per zip code each quarter. This reduction represents about 7% to 16% of the average total number of people who typically move in or out of each zip code every quarter. It also translates to a slight yet significant quarterly decrease of 0.3% to 0.7% in both population inflows and outflows for each zip code. Long-run estimates using yearly, county-level data from the 2013-2020 IRS data also confirm the overall stagnation effects post-retirement. In order to address potential endogeneity concerns, I conduct additional robustness checks using Coarsened Exact Matching (CEM) and instrumental variable (IV) strategies, which confirm this broader trend of diminished migration following plant closures.

Second, the study delves deeper into the heterogeneity of these stagnation effects across various zip code demographics, including age, income, and racial/ethnic composition. The findings consistently reveal heightened migration stagnation in communities with a higher Black population share, younger residents, and lower-income groups following fossil fuel retirements. Third, utilizing county-by-quarter data from the Quarterly Census on Employment and Wages (QCEW), the results show long-run stagnation in labor outcomes such as employment and wages. I also found that retirement leads to an increase in air quality, indicating improved environmental quality. However, the retirement of fossil-fuel generators leads to around a 3% decrease in housing value, suggesting that the anticipated amenity improvements post-retirement either don’t instantly resonate with residents or are overshadowed by economic considerations.

Section 4: Policy Implications

This analysis illuminates how migration responds to simultaneous and sometimes conflicting forces. The results offer important insights into how residents weigh competing factors when faced with co-occurring economic and environmental shifts. This has broad implications for models of location choice and residential mobility under multidimensional changes.

More broadly, these findings highlight the multifaceted ramifications of the energy transition, which carry important policy implications. As countries continue phasing out fossil fuel plants, understanding the intricate balance between positive and negative impacts becomes crucial. While retirements can lead to improvements in air quality and public health, they may also result in job losses, economic disruptions, and shifts in the housing market that could have long-lasting effects on communities. This research underscores the need for comprehensive transition policies that balance environmental benefits with socio-economic challenges. By providing a thorough analysis of the impacts of plant retirement on migration, this study offers valuable insights into how to support affected residents and prioritize competing needs.

References

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