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Analysis of wind energy's effect on local employment and income

Ben Gilbert, Colorado School of Mines; Ben Hoen, Lawrence Berkeley National Laboratory; Hannah Gagarin, Sandia National Laboratory

In 2024, Berkeley Lab collaborated with the Colorado School of Mines, to compile a unique dataset that includes employment and earnings records from 96 percent of all workers, and all utility-scale wind projects, across 23 states occurring between 2000 and 2020. All previous analyses of wind energy impacts have relied on data summarized at the county level, which masks effects that might occur at close distances from the project. This new analysis uses worker-level data based on a worker's residence location. The analysis spans more than six years before each project operation begins to six years after and is focused on effects within 20 miles of turbines. This allows an unprecedented examination of impacts on local employment and income through the full wind project development cycle. For additional information, graphs and analysis, see the report landing page.

The construction of onshore wind energy projects can be linked to several local economic impacts, including job creation, tax revenue, local landowner income, and changes to home sale prices. Because of the difficulty of assembling high-resolution data to examine relatively small effects, employment and income economic impacts remain understudied. This study uses data from more than 100 million individuals held in the US Census Bureau's Federal Statistical Research Data Center program, 9 million of those who live within 20 miles of existing wind projects and investigates employment and earnings records in the periods before, during, and after wind project construction. Report highlights are as follows:

Effects are evident within 20 miles of an operating wind project but not beyond that. Income and employment changes outside of 20 miles are either too small or too sporadic to be identified statistically.

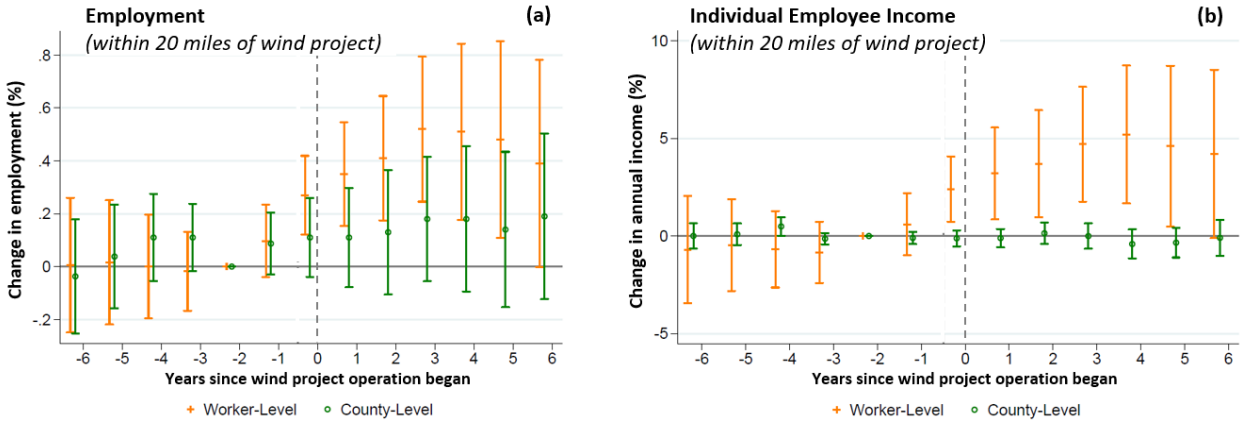

Figure 1a and 1b: Event study estimates using worker- and county-aggregated-level data for workers within 20 miles of a wind project with a capacity of at least 10 MW compared to all workers outside that distance. Points represent means, and error bars represent 95% confidence intervals. Figure (a) shows the percent changes in employment levels within 20 miles, and Figure (b) shows the percent changes in income for workers within 20 miles.

Within 20 miles of operating wind projects, we see increases in employment of roughly 0.4%. This equates to 230 jobs over the project's life. This is 2 to 4 times larger than those found in previous studies. These employment increases translate to one local FTE for each $2 million invested in the wind project.

We also see clear evidence of increases in worker income within 20 miles. An average of 4% increase in income is estimated for employed workers, equating to $1,270 annually. This translates into an increase of $0.16 for each dollar invested in the wind project.

Both employment and income increases remain six years after the wind project's construction begins, which implies effects are experienced well after construction ends. We hypothesize these are spillover (or secondary) effects derived from increased tax and lease revenue accrued locally and wind project-related employment, all of which exist for many years, if not the project's full life.

Segments of the population experience outsized effects compared to others. For example, black workers enjoy larger employment and income effects than white and Hispanic workers. Similarly, individuals without a high school diploma or those with a college degree see larger benefits than those who only completed high school. Finally, male workers are associated with considerably larger benefits from wind development than female workers.

Across all measures, the worker-level estimates used for this study are larger than county-level estimates, which are classically relied upon. This implies that the many studies that have relied on county-level estimates could be underestimating the size of the effects.

Acknowledgements

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