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# Emerging Energy Industries and Rural Growth

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## What Is the Issue?

The production of natural gas (primarily from unconventional sources), wind power, and corn-based ethanol in each case more than doubled from 2000 to 2010, with most of the growth occurring in rural areas with abundant land for drilling pads, wind turbines, and corn fields. (Unconventional natural gas is differentiated from regular natural gas by its unconventional extraction methods—hydraulic fracturing and horizontal drilling—that are used to reach gas trapped in relatively impermeable shale and sandstone). Previous studies have projected the new industries' contributions to local and regional economies. After industry expansion, it is useful to compare the projections with what actually happened.

## What Did the Study Find?

For two industries, the overall employment impacts were statistically significant. For counties in Colorado, Texas, and Wyoming that experienced a large increase in natural gas production, we find that natural gas development was associated with a 12-percent increase in total employment over 8 years. For a 12-State region stretching from Texas to North Dakota, counties with expansion in wind power experienced a 0.6-percent increase in average total employment over a similar period. For ethanol production, statistically significant employment growth can be confirmed only among closely linked industries such as trucking and natural gas distribution. The entrance of an ethanol plant in Midwestern counties led on average to a 0.9-percent increase in employment within industries that previous studies suggest are closely linked to ethanol production.

The contribution of each of these three energy industries to local employment growth varied. For both natural gas and wind counties, the average increase in county employment from all sources was about 3,000 jobs. The 1,780 new jobs associated with natural gas development therefore represented about half of the average increase in local employment. For wind, the 60 new jobs associated with wind power development represented roughly 2 percent of the average increase in county employment from all sources. For counties with an ethanol plant, the average increase in local employment from all sources was smaller, at 254 jobs. The effect of 1 ethanol plant on local employment in closely linked industries, at 82 jobs, therefore represented a large share of employment growth in the typical ethanol plant county.

The effect of natural gas development, despite its relatively large employment effect, is smaller than what prior studies projected. Estimates for wind turbines and ethanol plants, in contrast, are consistent with some earlier projections.

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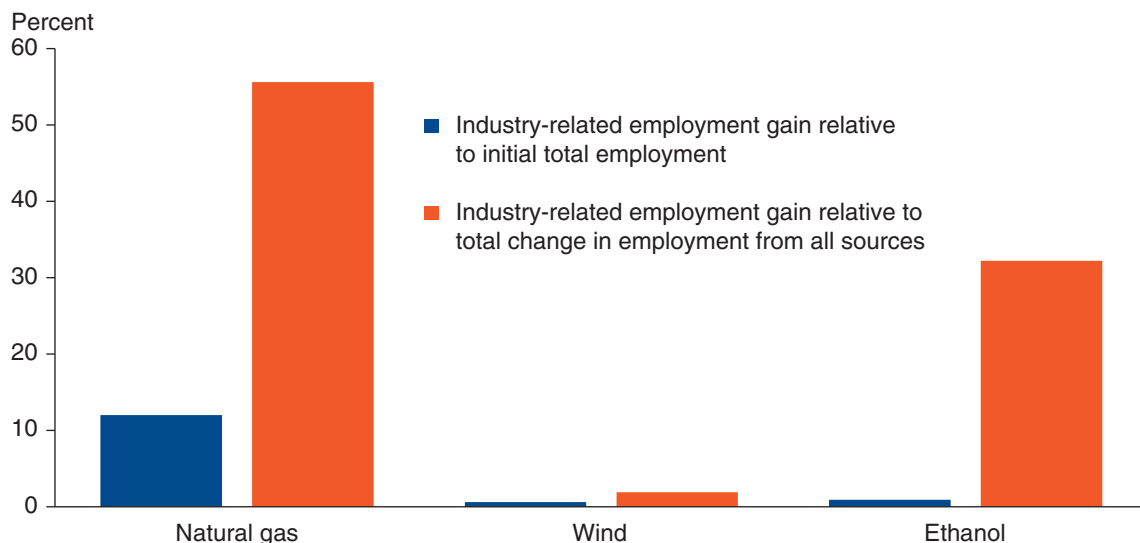
Overall, our findings suggest that expansion of unconventional gas drilling (and with similar technology, oil drilling) will contribute the most to short-term economic growth across rural areas, while the wind and ethanol industries will have more modest effects. Looking ahead, the growth potential of the three industries and their contribution to local economies may be quite different than what these short-term economic effects suggest. Gas reserves in specific locations will eventually decline, ethanol plants will have to compete with other end users for feedstocks, and variable winds pose increasing challenges for the electrical grid as their role as a power source increases. In addition, the environmental impacts associated with further development of each of these energy industries could lead to countervailing contractions in other local industries in the long run.

Our analysis provides a limited view of how the industries affect life in rural communities. The costs and benefits related to the industry can be unevenly distributed among local residents. Furthermore, the net economic benefits to an area may be quite different than gross private monetary gains measured by employment or personal income. A review of the literature suggests that the environmental impacts from wind power development are fewer compared with extracting natural gas and producing corn-based ethanol. However, each industry brings its own challenges for local communities: groundwater and road traffic concerns with natural gas; disruption of the landscape by wind turbines; and use of wastewater or water from ethanol plants.

## How Was the Study Conducted?

This report synthesizes and builds on recent studies by ERS economists that used empirical approaches to estimate causal effects based on a model of what would have happened in a county if expansion of the energy industry in question had never occurred. The industry-specific studies discussed in this report employed a combination of matching and regression analysis, including difference-in-difference and instrumental variable estimation. Despite differences in statistical details, the three studies share the same empirical thrust. They compare the growth in counties where the energy industry expanded with the growth in counties with less or no expansion, while controlling for other potential differences between counties. The studies draw primarily on data from the U.S. Department of Commerce’s Bureau of Economic Analysis Local Area Personal Income and Employment estimates, the Bureau of Labor Statistics Quarterly Census of Employment and Wages, State agencies that monitor oil and gas development, Lawrence Berkeley National Laboratory, and National Renewable Energy Laboratory.

### Employment gains from the emergence of energy industries in selected regions



Source: USDA, Economic Research Service.