Energy program on chopping block, but new data suggest it works

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Do energy efficiency "audits" really benefit companies over time? An interdisciplinary team of Duke researchers (economist Gale Boyd, statistician Jerome "Jerry" Reiter, and doctoral student Nicole Dalzell) have been tackling this question as it applies to a long-running Department of Energy (DOE) effort that is slated for elimination under President Trump's proposed budget.

Evaluating a long-running energy efficiency effort

Since 1976, the DOE's Industrial Assessments Centers (IAC) program has aimed to help small- and medium-sized manufacturers to become more energy-efficient by providing free energy "audits" from universities across the country. (Currently, 28 universities take part, including North Carolina State University.)

The Duke researchers' project, supported by an Energy Research Seed Fund grant, has yielded a statistically sound new technique for matching publicly available IAC data with confidential plant information collected in the U.S. Census of Manufacturing (CMF).

The team has created a groundbreaking linked database that will be available in the Federal Statistical Research Data Center network for use by other researchers. Currently the database links IAC data from 2007 and confidential plant data from the 2012 CMF, but it can be expanded to include additional years.

The team's analysis of this linked data indicate that companies participating in the DOE's IAC program do become more efficient and improve in efficiency ranking over time when compared to peer companies in the same industry. Additional analysis could reveal the characteristics of companies that benefit most and the interventions that are most effective.

Applications for government, industry, utilities, researchers

This data could be used to inform the DOE's IAC program, if the program is not eliminated.

But the data have other potential applications, too, says Boyd.

Individual companies who took part in the DOE program could discover the relative yields of their own energy efficiency measures: savings over time as well as how their efficiency ranking among peers has shifted.

Researchers, states, and utilities could use the data to identify manufacturing sectors and types of businesses that benefit most from information about energy efficiency measures, the specific measures connected with savings, and non-energy benefits of energy efficiency, e.g. on productivity.

Meanwhile, the probabilistic matching techniques developed as part of the project could help researchers in a range of fields—from public health to education—to build a better understanding of populations by linking data sets in statistically sound ways.

An interdisciplinary team leveraging Duke talent and resources

Boyd—a Duke economist who previously spent two decades doing applied policy evaluation at Argonne National Laboratory—has been using Census data to study [energy](#) efficiency and productivity for more than fifteen years. Boyd has co-appointments in Duke's Social Science Research Institute and Department of Economics. He now directs the Triangle Research Data Center (TRDC), a partnership between the U.S. Census Bureau and Duke University in cooperation with the University of North Carolina and Research Triangle Institute.

The TRDC (located in Gross Hall for Interdisciplinary Innovation) is one of more than 30 locations in the country where researchers can access the confidential micro-data collected by the Federal Statistical System.

Jerry Reiter is a professor in Duke's Department of Statistical Science, associate director of the Information Initiative at Duke (iiD), and a Duke alumnus (B.S'92). Reiter was dissertation supervisor for Nicole Dalzell, who completed her Ph.D. at Duke this spring and will be an assistant teaching professor in the Department of Mathematics and Statistics at Wake Forest University in the fall.

Boyd reports, "The opportunity to work in an interdisciplinary team with Jerry (one of the nation's leading researchers on imputation and synthetic data) and Nicole (one of Duke's bright new minds in this field) has opened my eyes a bit about how cavalier some researchers are with respect to uncertainty when we link datasets. Statisticians' expertise in these areas can help the rest of us do better research, making it as sound and defensible as possible."

What's next for the project

The collaboration was made by possible by the Duke University Energy Initiative's Energy Research Seed Fund, which supports new

interdisciplinary research teams to secure preliminary results that can help secure external funding. The grant was co-funded by the Pratt School of Engineering and Information Initiative at Duke (iiD).

Given the potential uses of the team's results by the private sector (particularly by electric utilities), other funding possibilities are likely to emerge.

Boyd, Reiter, and Dalzell have submitted an article to the journal *Energy Policy* and are discussing future research application of this data with colleagues in the field of energy efficiency and policy. Their working paper is available as part of the Environmental and Energy Economics Working Paper Series organized by the Energy Initiative and the Nicholas Institute for Environmental Policy Solutions.

  More information: Creating Linked Datasets for SME Energy-Assessment Evidence Building: Results from the U.S. Industrial Assessment Center Program: sites.nicholasinstitute.duke.e … 7/06/WP-EE-17_02.pdf

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