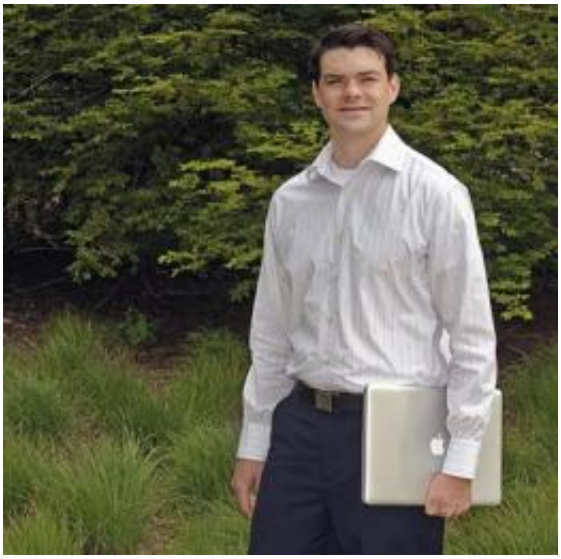
Iowa State engineer explores intersection of engineering, economics and green policy

May 24 2010



W. Ross Morrow is developing large-scale computer models of engineering and economic systems that involve government, corporations, technology and consumers. Credit: Photo by Bob Elbert/Iowa State University

Engineers bring a critical perspective to the economic models and mathematical predictions that are used to influence public policy, says Iowa State mechanical engineer W. Ross Morrow.

"With these quantitative models, people in policy and economics tend to take them at their word," said Morrow, an Iowa State University assistant professor of mechanical engineering with a courtesy appointment in economics. "Engineers bring a great skepticism about what the models

say. They ask, 'What evidence is the model based on?'"

Morrow, who's finishing his first year at Iowa State, knows what he's talking about. He's building a research career on improving large-scale computer models of engineering and economic systems. He's focusing on energy and environmental issues that involve government, corporations, technology and consumers.

As a doctoral student at the University of Michigan, Morrow developed new theories and numerical methods to analyze the government policies regulating greenhouse gas emissions and their effects on the auto industry's design and pricing decisions.

Then, as a post-doctoral researcher at Harvard University's Belfer Center for Science and International Affairs, he and colleagues studied how hikes in gas taxes could reduce greenhouse gas emissions from transportation. When their report was released in March, it made The New York Times' Dot Earth blog, Rush Limbaugh's radio show and an interview on Bloomberg Television.

As an Iowa State faculty member, he's continuing to look at numerical methods for modeling engineering and economic systems. He's working to improve how models handle something as complex and uncertain as the energy industry. How do models, for example, account for uncertainties about the future of oil reserves and advances in vehicle technology?

He also wants to develop new technical solutions to building large-scale, complex models that take into account engineering technology and market behavior.

He fills his research summaries with talk of random utility models of consumer choice, design-centered policy analysis and the Poincare-Hopf

theorem. Ask about his work and he mentions the National Energy Modeling System, Bertrand-Nash equilibrium prices and game theoretical models.

All those tools help him develop models that can better inform environmental policy, industrial decisions and consumer behavior.

And Morrow says it's good to have somebody with three degrees in mechanical engineering (plus one in math) working on those kinds of problems.

"These issues involving energy and the environment will be solved, in part, by technology," he said. "And so engineers have to be involved in the discussions. It's important to have people who develop technology to be involved in policy development."

And it works the other way around, too.

"Engineers," he said, "also have to understand how technology decisions influence people's lives."

Provided by Iowa State University