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Building a Model to Analyze the Impacts of Non-Wires Alternatives at DTE Energy

Based in Detroit, and with roots going back to 1849, DTE Energy is a diversified energy company involved in developing and managing energy-related businesses and services in the United States and Canada.

DTE Energy's utility operating units are DTE Electric Company, a state-regulated electric utility serving 2.2 million customers in Southeastern Michigan; and DTE Gas, a state-regulated natural gas utility serving 1.2 million customers in Michigan.

The company's non-utility energy businesses include DTE Power & Industrial, which encompasses three main business lines, Industrial Energy Services, Renewable Energy and Environmental Controls, as well as DTE Biomass Energy, an independent subsidiary; DTE Midstream, a builder, investor and owner-operator of gathering, regulated natural gas pipelines, and gas storage assets; and DTE Energy Trading, an active physical and financial gas, power and environmental marketing company.

DTE Energy has more than 10,000 employees and reported $10.6 billion in operating revenue for 2016.

The company's corporate strategy group works to address a variety of complex issues facing the energy industry. These issues include Non-Wires Alternatives (NWAs), an increasingly prominent topic within the electric utility industry. NWAs are technologies that delay or eliminate the need for traditional distribution or transmission investments by reducing the peak load on existing infrastructure. NWAs either reduce energy demand or provide local energy generation during times when peak load would otherwise exceed existing equipment capacity ratings.

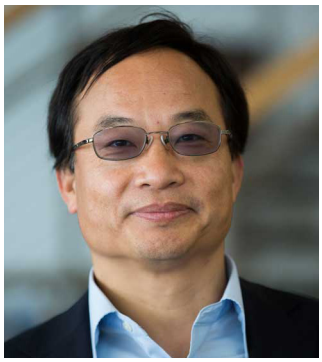
Currently, different NWAs are being piloted by DTE to determine their feasibility as a cost-effective alternative to traditional substation capacity investments. In order to build a benefit-cost analysis (BCA) framework and model to analyze the impacts of NWAs, DTE's corporate strategy group brought in a student team from the Tauber Institute for Global Operations at the University of Michigan, consisting of **Blake Bogart**, working on a Master of Business Administration degree, and **Graham McCarthy**, a member of the Engineering Global Leadership Honors (EGL) Program, which leads to BSE in Aerospace Engineering and MSE in Industrial and Operations Engineering degrees.

Above, L to R: Stephen Harvey, Graham McCarthy, Nathan Bennett, Blake Bogart, and Paul Clyde

"NWA technologies affect multiple functional groups within DTE, so the model and framework provide an efficient and clear way to organize their cost analysis."
Blake Bogart

DTE's objective for this project was to create a standard method of quantifying the relevant benefits and costs of implementing NWAs beyond the deferral of capital expenditures to better evaluate potential NWA opportunities.

"The purpose of the project was to develop a DTE-specific BCA methodology and financial model to evaluate NWAs against traditional capacity investments," said Bogart. "NWAs are technologies such as energy storage, solar panels, generators, demand response programs, and energy waste reduction programs that, when located or targeted at the substation level, can reduce peak demand on the existing infrastructure.



Xiuli Chao
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The project involved considerable research into the analysis frameworks created by other states, the regulatory and business environment DTE operates within, and the technologies themselves."

To create a model capable of quantifying the benefits and costs of all the NWA technologies relevant to DTE, the Tauber team benchmarked existing benefit-cost frameworks as well as NWA cost and capabilities characteristics. Further interviews with DTE subject matter experts enabled the creation of a BCA model specific to DTE's technology implementations.

"The primary innovative aspect of the project was consolidating the format and information requirements necessary to evaluate NWAs," said Bogart. "NWA technologies affect multiple functional groups within DTE, so the model and framework provide an efficient and clear way to organize their cost analysis. The most unique feature is the sheer number of groups within DTE that required input when working in NWAs.

"The key drivers behind the project design are regulatory changes in other states that incentivize or require the evaluation of NWA technologies. It is possible similar requirements could be put in place in Michigan. Additionally, NWAs offer opportunities to reduce investment costs when applicable."

The model was used to analyze two existing substations being considered as potential NWA pilot sites. After conducting sensitivity analyses related to future NWA cost decreases and the cost of traditional capacity investments, it was found that NWAs would be 70 to 350 percent more expensive than traditional capacity investments in all but the most favorable scenarios. Going forward, this model will lay the foundation for the benefit-cost test used in the NWA suitability analysis process.

"The model was used to evaluate a few potential NWA opportunities, but cost reductions in the NWA technologies are necessary to make them financially feasible in most cases," said Bogart. "The primary challenge with this project is how new many of these technologies are and the relatively limited experience DTE has with applying them at the distribution level. Even outside of DTE, relatively few utilities have significant experience implementing distribution level NWAs."

DTE Energy Project Team

Student Team
Blake Bogart–Master of Business Administration

Graham McCarthy–EGL BSE Aerospace Engineering, MSE Industrial and Operations Engineering

Project Sponsors
Nathan Dirk Bennett – Associate, Corporate Strategy

Stephen Harvey – Associate, Corporate Strategy

Michael Seischab – Director, Corporate Strategy

Faculty Advisors
Xiuli Chao–College of Engineering

Paul Clyde–Ross School of Business

About Tauber Team Projects

The 2019 Tauber Team Projects resulted in $390.3 million in savings according to sponsoring company calculations, an average of $30 million per project over 3 years. Each two to three person Tauber Team consists of graduate engineering and/or graduate business students. Along with receiving high-level corporate support from the sponsoring company, each team is advised by a College of Engineering and a Ross School of Business faculty member and overseen by a Tauber Institute Co-Director. The projects begin on-site in May and continue for 14 weeks. Students present the results of their projects and compete for over $40,000 in scholarships at the U-M Tauber Institute's annual Spotlight! event, held each September in Ann Arbor, Michigan. Spotlight! provides outstanding opportunities for students and corporate partners to establish relationships while exploring innovations in operations and manufacturing.

To learn more about the Tauber Institute for Global Operations, visit tauber.umich.edu or contact us at 734-647-1333.

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